The RUBBER AGE

July, 1943

TECHNOLOGY DEPT. DETROIT

GR-S and KALVAN

TWO REASONS FOR USING SOME KALVAN IN GR-S COMPOUNDING–

First

KALVAN improves tear resistance and assists in removing cured articles from hot molds.

Second

Substitution of KALVAN for one-third or one-half of the black ordinarily used gives improved building tack.

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

Newsletter No. 7
JULY, 1943

Published by Rubber Chemicals Division of DU PONT

Safe Processing Fast Curing Neoprene Type GN Stocks Containing Acetate and Permalux

MUCH concern is expressed over the possibility of an equipment shortage developing due to the greater time required for processing and curing synthetic rubber products. That phase of the problem involving a possible shortage of curing equipment can be happily solved in neoprene stocks by the use of the retarder-activator combination of sodium acetate and PERMALUX. You have recognized for some time the fact that various phenolic bodies, such as catechol and PERMALUX (the DOTG salt of dicatechol borate), are very effective accelerators for neoprene compounds. However, the usefulness of these organic accelerators has been materially restricted due to the fact that for most purposes they destabilize the stock to such an extent that it cannot be safely processed.

SODIUM ACETATE has been found to be an effective retarder at processing temperatures for Neoprene Type GN stocks cured with magnesia and zinc oxide. Even when these stocks are activated with Permalux, the processing safety of the compounds produced is better than a normal neoprene stock containing neither the retarder nor the activator. Sodium acetate is not effective in stocks cured with litharge alone or with litharge in combination with zinc oxide or magnesia.

The outstanding value of using the retarder-accelerator combination (sodium acetate and PERMALUX) in a Neoprene Type GN stock is illustrated by the data in the accompanying table. It should be particularly noted that Stock No. 19 containing the sodium acetate and PERMALUX is slightly safer processing than the control Stock No. 17 as measured by the 60-minute at 227° F. cure. However, at the normal curing temperature of 287° F. (40 pounds per square inch steam) the optimum cure on the control Stock No. 17 was 30 minutes whereas Stock No. 19 containing sodium acetate and PERMALUX was completely cured in 15 minutes. The tensile strength, hardness and tear strength of both stocks are comparable. A further indication of the faster rate of cure obtained by the sodium acetate-PERMALUX combination can be seen from a measure of the resilience.

MAXIMUM PROCESSING SAFETY—In many manufacturing processes it is impossible to avoid reprocessing of stocks. In such cases difficulty has sometimes been experienced due to the insufficient stability of the normal Neoprene Type GN stocks. In these cases considerable advantage can be gained by the use of sodium acetate alone as a retarder of vulcanization during the processing stage. At curing temperatures, the sodium acetate is a mild activator of vulcanization. In this respect sodium acetate in Neoprene Type GN reacts in much the same manner as RETARDER W in rubber.

Sodium acetate is available in both flake and granular form. *It is most important that only the Granular 60 per cent Sodium Acetate be used because it disperses much more readily than does the flake form.*

Effect of Sodium Acetate and Permalux in a Moderately Loaded Neoprene Stock Containing 30 Parts Channel Black

Stock	17	19
Neoprene Type GN	100.0	100.0
NEOZONE A	2.0	2.0
Stearic Acid	2.0	2.0
Extra Light Calcined Magnesia	4.0	4.0
Channel Carbon Black	30.0	30.0
Process Oil	3.0	3.0
Sodium Acetate .3H$_2$0	—	1.0
PERMALUX	—	1.0
Zinc Oxide	5.0	5.0
Original Plasticity-Recovery 80°C.—Williams' Plastometer	110-6	115-15
Processing Stability (Cure 60 min. at 227°F.)		
Stress at 600% Elongation—psi.	125	50
Tensile Strength at Break—psi.	550	325
Elongation at Break—%	1045	1060
Hardness—Shore "A"	40	37
Vulcanized Properties		
Optimum Cure at 287°F. (40 psi.) min.	30	15
Stress at 500% Elongation—psi.	2000	1800
Tensile Strength at Break—psi.	3450	3200
Elongation at Break—%	820	840
Hardness—Shore "A"	60	62
Tear Strength—lbs. per inch	410	400
Heat Build-Up*—Goodrich Flexometer ⅛" Stroke for 20 min.—°C.	42	30

*Press Cure—120 min. at 287° F.—operated at 1800 cycles per minute with load of 153.3 lbs. per square inch on pellets 0.75" diameter x 1.0" high.

Through the mill

GRANULAR 60% SODIUM ACETATE—Inquiries regarding, or orders for this material should be sent to:

E. I. du Pont de Nemours & Company, (Inc.)
Electrochemicals Department
Miscellaneous Sales Division
Empire State Building
New York, New York

or

E. I. du Pont de Nemours & Company, (Inc.)
Grasselli Chemicals Dept.,
Wilmington, Delaware

NEOPRENE IS FUNGUS RESISTANT—The prevention of fungus growth is of considerable importance in obtaining maximum service life of products which contain fabric and which are used under damp, humid conditions. Neoprene will not support the growth of fungus spores even under the most favorable conditions. Therefore, no added fungicide is needed when making up stocks for use in items such as life rafts, pontoons, hose, belting, boots, cables and mining accessories. Cotton fabrics which have been frictioned and skimmed with a neoprene compound do not deteriorate by mold growth.

BUNA S is expected to replace natural rubber at an accelerating rate during the coming months as additional plants begin producing this material. We will be pleased to assist you in any of your Buna S compounding problems. Please continue to bring these problems to our attention so that we may work together in the development of the best possible Buna S compounds.

NO TOXICITY—An independent investigator, after making numerous tests, gives the following statement: "There was no evidence whatever among our subjects that neoprene sponge is irritating or toxic to the human skin."

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

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TECHNOLOGY DEPT

Some will soften up Berlin

hycar

LARGEST INDEPENDENT PRODUCER OF BUTADIENE SYNTHETIC RUBBER IN AMERICA

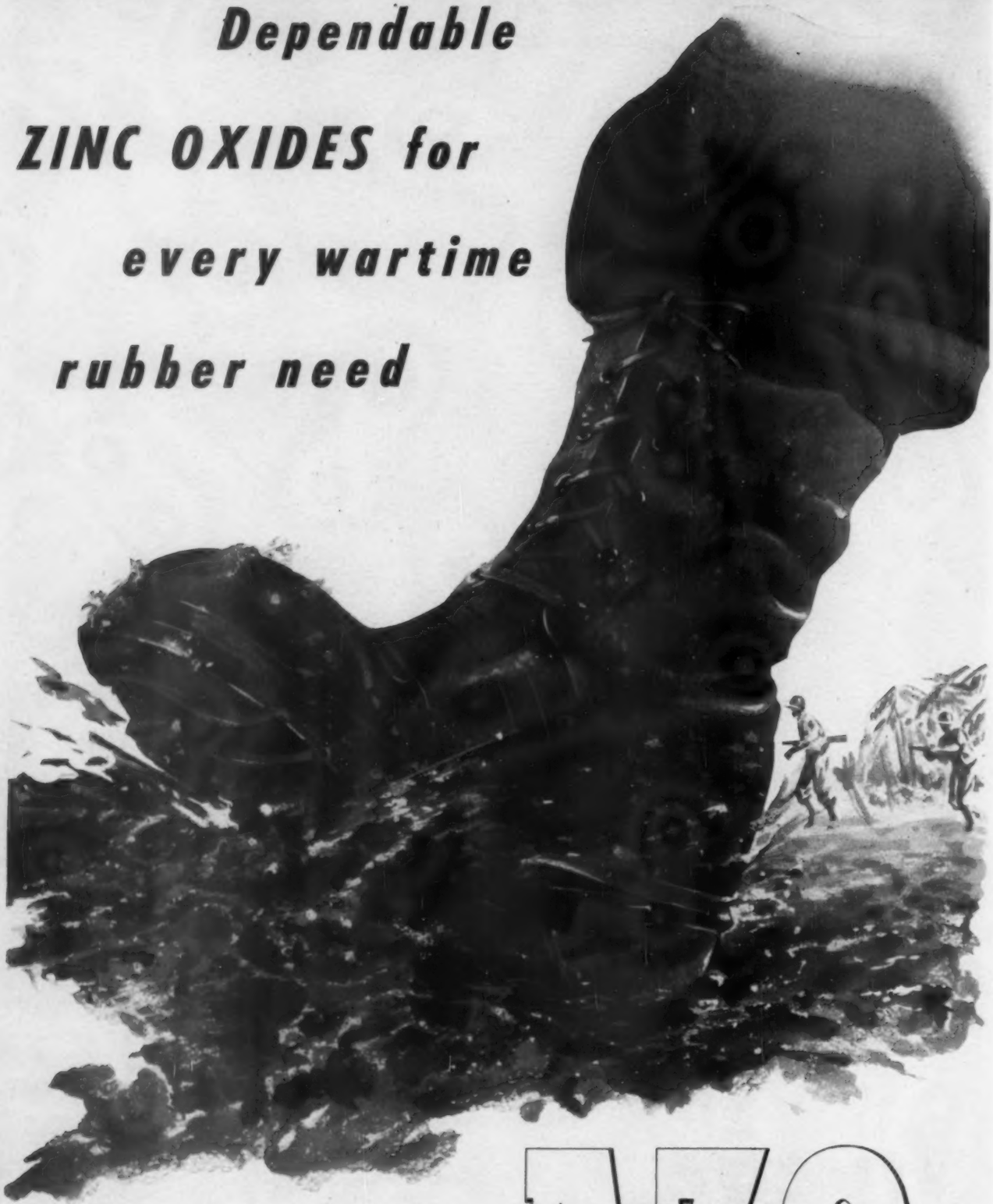
AMONG the many activities of Hycar's Customer Service Laboratory, none has been more important in the development of today's specialized aircraft stocks than the continuing, exhaustive study of softeners.

Since shortly before Pearl Harbor, literally thousands of recipes have been made and subjected to the most rigorous tests. From this research have come Hycar compounds that help make possible the high-altitude operation of our precision bombers, whose power the Axis is now learning about first-hand.

Similar research is going on constantly at the Hycar Laboratory to assist rubber fabricators with their compounding and processing problems. These facilities, personnel and experience, together with a field staff of trained technicians, are always ready to serve you.

HYCAR CHEMICAL CO.
AKRON, OHIO

Dependable ZINC OXIDES for every wartime rubber need



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ZINC OXIDES

AMERICAN ZINC SALES CO., Distributors for AMERICAN ZINC, LEAD & SMELTING CO.

COLUMBUS, OHIO - CHICAGO - ST. LOUIS - NEW YORK

New Life for Reclaim

• NAFTOLEN, when used with reclaim, produces snappy stocks of high elongation and high resilience. The uncured compounds are smooth-processing. Furthermore, they will not dry out in storage, which is of importance in the production of tack-retaining friction stocks. For all-reclaim stocks we suggest five to ten parts of NAFTOLEN R-100 on the rubber hydrocarbon. NAFTOLEN is highly compatible with both reclaimed rubber and GR-S. When working with mixtures of these two materials we suggest that, before blending, sufficient NAFTOLEN be used to bring the GR-S to the same degree of plasticity as that of the reclaim.

WILMINGTON CHEMICAL CORPORATION

10 East 40th Street — **New York 16, N. Y.**

Plant and Laboratory: — *Wilmington, Delaware*

Capitol Process Liner Treatment

versus

Untreated Liners

If you are using untreated liners because it has been believed that processing would make them too expensive, we emphasize that Capitol Process Liner Treatment is reasonable in cost.

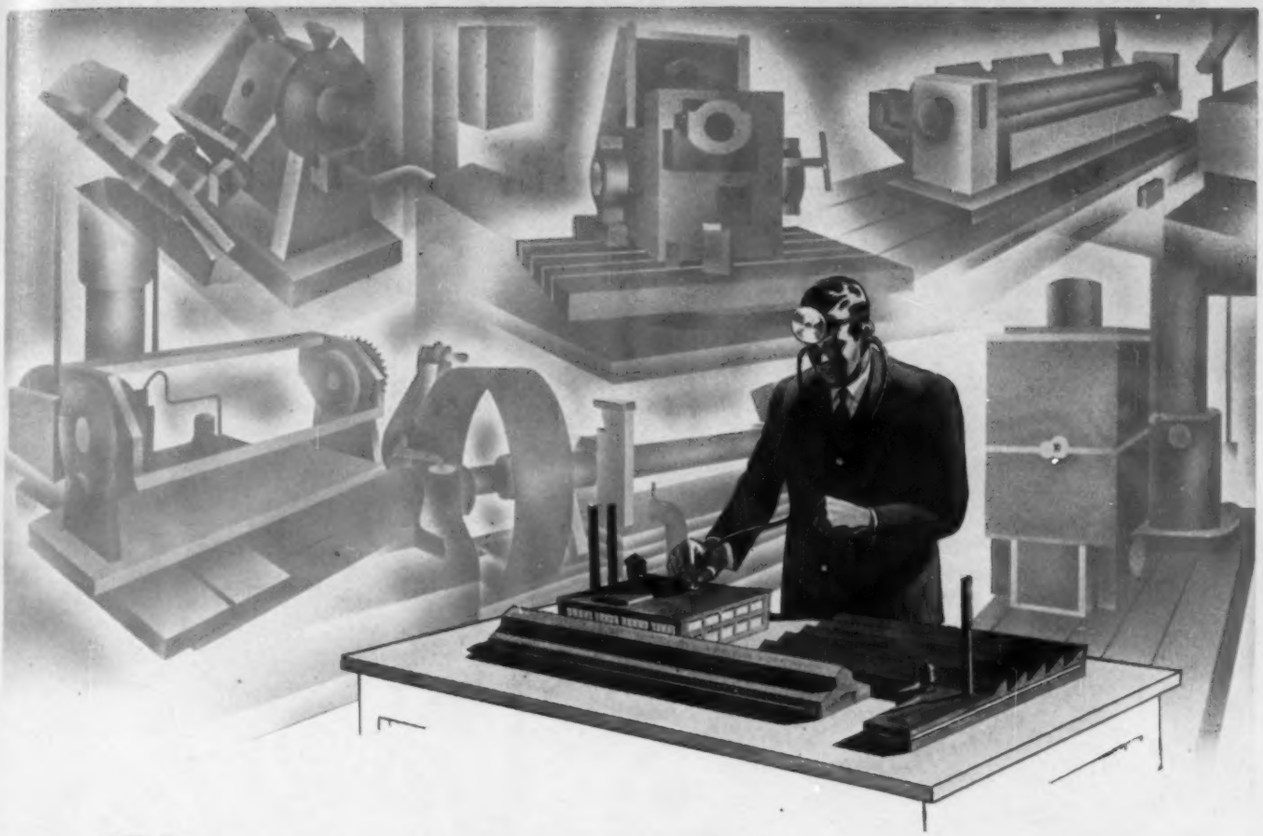
Further, our treatment will make it possible to use your liners for a considerably longer time, thus actually reducing purchases of new cotton piece goods. Over a period of time Capitol Liner Treatment will, literally, "pay for itself."

Take advantage of our offer to process a sample liner gratis. Send 50 or 100 yards and we will treat it and return for testing in your plant. No obligation will be incurred.

TEXTILE PROOFERS, INC.

181-193 Culver Ave., Jersey City, N. J.

Originators of the Capitol Process Liner Treatment



We took our own medicine —and quadrupled production

OUR engineers have a new assignment. Normally, their time and talents go into the development of special machines to increase production and cut costs for our customers, the volume producers of rubber and plastics products. Now those engineers are working on our own volume production of essential war products . . . gun mounts, tank sections, catapults.

With the same engineering effort normally spent on customer's problems, they enabled us in 15 months to quadruple our war production without adding substantially to either plant or equipment.

This four-fold increase was accomplished by designing jigs and fixtures that simplified machine operations on standard tools, speeding the flow of work, and assuring the required precision.

That one stroke achieved two other important ends—made it unnecessary to wait for special machines; allowed us to use relatively inexperienced operators who, with the aid of these fixtures, could work to the close tolerances specified.

For other people's problems of mass production, Creative Engineering has long been our medicine. When finally we faced that problem ourselves, we found our medicine good for us, too.

NATIONAL RUBBER MACHINERY COMPANY

General Offices: Akron, Ohio

CREATIVE ENGINEERING

During these critical times of shortages, peak loads and wartime schedules new and difficult compounding problems quickly arise. Many of these are being avoided today by the use of

VULCANIZED VEGETABLE OILS

— RUBBER SUBSTITUTES —

a long established and proven product

for

NATURAL, RECLAIMED AND SYNTHETIC RUBBER COMPOUNDING.

In the 40th year of continuous production.

THE CARTER BELL MFG. CO.

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SYN-TAC

IMPROVES TACK
IMPROVES DISPERSION
IMPROVES TEAR
IMPROVES ELONGATION

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CHEMICAL MANUFACTURERS

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1. Climco Processing insures better separation and it prevents stock adhesions.
2. Climco Processing eliminates repair of cut or torn liners, and rerolling for cooling.
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These time-and-money saving advantages are proven by the fact that Climco Processing has had overwhelming preference throughout the industry for the past 20 years. Give Climco Processing a trial in your plant *now*.

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THE CLEVELAND LINER & MFG. CO.
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Treatment Contains
NO OIL OR WAX
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CLIMCO PROCESSED LINERS

FOR FASTER, BETTER PRODUCTION AT LOWER COST

ALL OUT TO WIN THE WAR

UNITED BLACKS KEEP GREMLINS
FROM YOUR RUBBER COMPOUNDS

KOSMOBILE 77 · DIXIEDENSED 77
DIXIEDENSED · KOSMOBILE
KOSMOS 20 · DIXIE 20

UNITED CARBON COMPANY, INC.

Charleston, West Virginia

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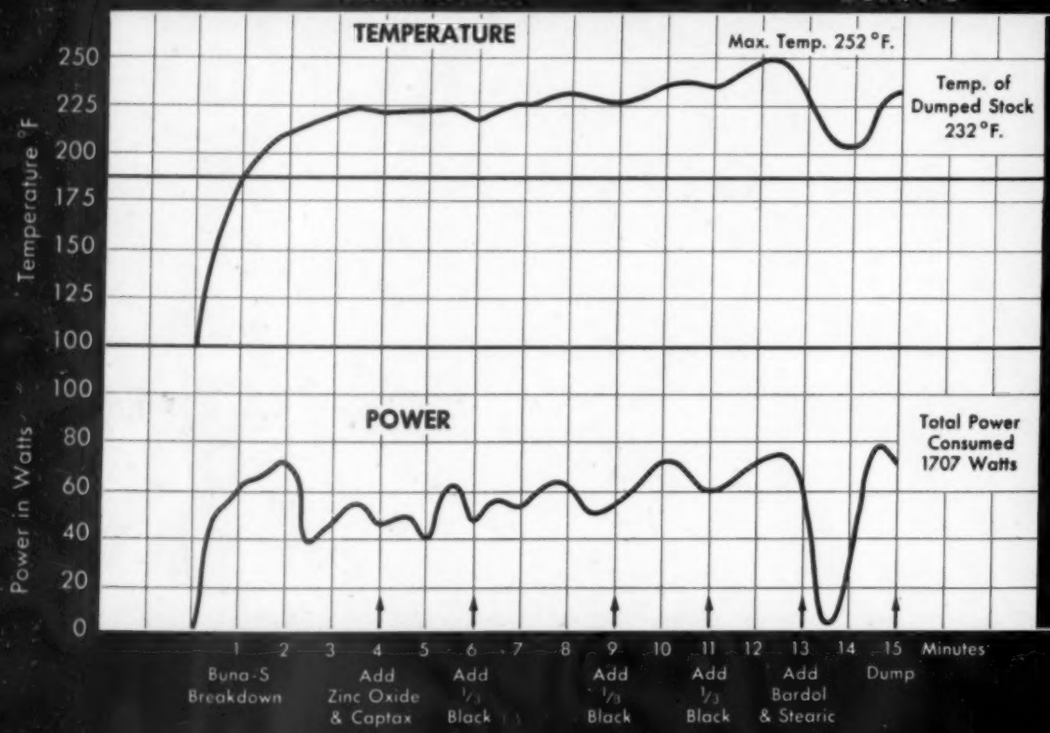
TEMPERATURE RISE & POWER CONSUMPTION IN BANBURY "B"

KOSMOS-20 BUNA-S



RECIPE	
Buna-S	100
Sulphur	2
Zinc Oxide	5
Kosmos 20	50
Captax	1.5
Bardol	5.
Stearic Acid	1.5

BANBURY CONDITIONS	
Batch Size, Grams	1200
Cooling Water	100 °F
Speed, R.P.M.	
Front Rotor	115
Back Rotor	102

Research Division
United Carbon Co. Inc.
Charleston, W. Va.

Chart # 1

This is the first of a series of charts depicting the temperature rise and power consumption of UNITED BLACKS in Buna S when mixed in a Banbury.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

CHARLESTON, W. VA.

Cc-COLD?

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Only titanium pigments, of which TITANOX is the oldest and most widely used, give all of the benefits on which the value of opaque pigments is based. Principal among these benefits is the ability to produce desired whiteness and brightness with a minimum of pigmentation.

Thus in these times of rising manufacturing costs, the unsurpassed tinting strength of TITANOX contributes to desired economy wherever white pigments are used to whiten or lighten rubber products as for example, in hospital sheetings and gas masks.

This color benefit is permanent and will outlast the use-life of the product because the whiteness of TITANOX pigments is unchanging. This applies equally to synthetics, natural and reclaimed rubber.

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TITANOX

TITANOX

TRADE MARK

To Meet a Wartime Challenge...

PICTAR

brings these advantages in compounding Buna S (GR-S)

1. Effective softener and plasticizer.
2. Definite aid in the dispersion of sulfur, accelerator and pigments which results in better performance of the finished product.
3. Replacement for pine tar either partial or complete.
4. Unlimited availability for prompt shipment.

Manufactured by Pennsylvania Industrial Chemical Corp.

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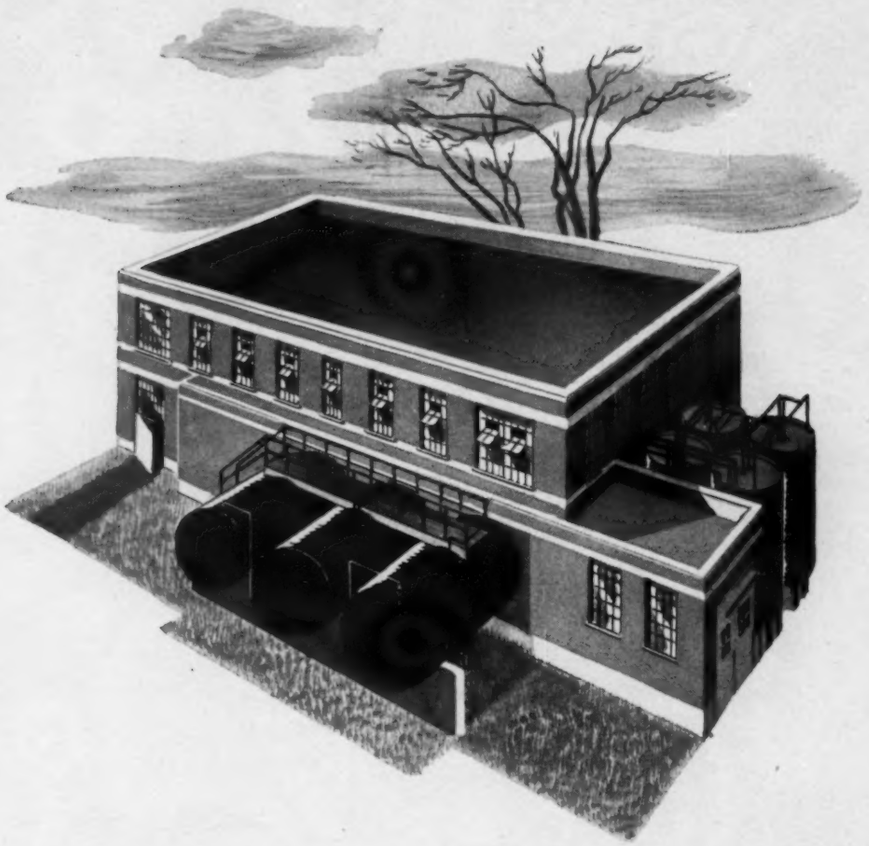

First Synthetic Rubber Plant

in the British Empire

JUST a few days ago this compact plant in Canada started production of Thiokol* synthetic rubber . . . man-made rubber that will increase our own synthetic stockpile and will be a direct help to the United Nations in their fight for victory.

We of the Thiokol Corporation want to congratulate Naugatuck Chemicals Ltd. of Canada — wish them every success. We are proud that our synthetic was the one chosen to be the first ever produced in the British Empire.

In this country Thiokol synthetic rubber has found scores of important uses. Among these are collapsible Mareng containers for storing and transporting gasoline and oil . . . lining for underground fuel vaults . . . corrosion-proof coatings for naval vessels . . . fuel hose of every description . . . gasoline-, oil-, and solvent-proof putties, adhesives and cements . . . diaphragms, packings and gaskets.

We hope these applications will not only stand as examples of Thiokol's versatility, but will also spur our Canadian associate to develop additional war and peacetime applications of this remarkable synthetic.

Thiokol Corporation, Trenton, N. J.

*Thiokol Corporation Trademark, Reg. U. S. Pat. Off.

Thiokol*

SYNTHETIC RUBBER

"America's First"

You Can't Specify Ability

When you place an order for a particular type of zinc oxide, the most important part of your specification is that which no specification could possibly contain—namely, the ability of the producer *to live up to it.*

We have yet to meet a problem involving the use of zinc oxides which hasn't been solved to the consumer's complete satisfaction from the standpoint of both quality and uniformity. This is due to the fact that ST. JOE Lead-Free ZINC OXIDES are produced direct from ore by a patented electro-thermic process, which enables us to exercise a degree of product-control unattainable by any other means of production.

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WHILE the staggering demands of war have placed a tremendous strain upon the production facilities of American Industry, there has been a vital need for the maintenance of high standards of quality as well. For this is a war of survival and only the finest fighting equipment and materiel will do. The strong, sturdy, uniform quality of MT. VERNON Fabrics is enabling them to perform their many war time jobs with the same tenacity and the same degree of dependability that has made them famous in hundreds of peace time applications.

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CLOSE HARMONY

PELLETEX and BUNA S

In the compounding of synthetic rubber under the forced draft of war necessity, the superior advantages of PELLETEX and GASTEX, pioneers and leaders among semi-reinforcing carbon black pigments, have been quickly recognized. Without the introduction of a semi-reinforcing black, loaves of baled rubber as pictured here, would be less useful in many applications.

The easy processing and superior aging properties of PELLETEX, its low heat build up, resistance to oxidation, and low permanent set make it the choice of leading technicians, while its ability to endure heavy loadings without undue stiffness is of great importance at this time.

Finally, the well-known properties of PELLETEX compounds in withstanding severe service conditions particularly when oils, acids, and solvents are encountered, further accent its popularity.

Now on 100% Government allocation, PELLETEX thus merits your consideration for post-war developments.

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THE C. P. HALL CO. OF CALIF., Los Angeles
HERRON & MEYER, Chicago
H. M. ROYAL, INC., Trenton, N. J.
ST. LAWRENCE CHEMICAL CO., LTD., Toronto - Montreal

coal is the great storehouse of plastics

PHENOLIC RESINS

Their relation to coal:

Phenol, cresol, xylenol are coal tar compounds.

PHENOL-FURFURAL RESINS

Their relation to coal:

Phenol, cresol, xylenol are coal tar compounds.

VINYL RESINS

Their relation to coal:

Calcium carbide, from coke and limestone, yields acetylene, basis for vinyl resins.

STYRENE RESINS

Their relation to coal:

Styrene is made from benzene, recovered from coke oven light oils.

MELAMINE RESINS

Their relation to coal:

Melamine is produced from cyanamid, made from coke.

UREA RESINS

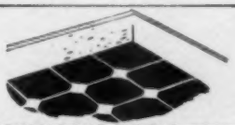
Their relation to coal:

Water gas, made from coke, furnishes the raw material for urea and formaldehyde.

ANILINE-FORMALDEHYDE RESINS

Their relation to coal:

Aniline is made from benzene, recovered from coke oven light oils.



COUMARONE-INDENE RESINS

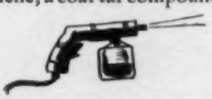
Their relation to coal:

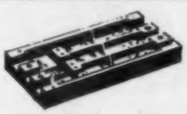
Coumarone-indene is derived from coal tar solvent naphtha.

ALKYD RESINS

Their relation to coal:

Phthalic anhydride for alkyd resins is derived from naphthalene, a coal tar compound.





COLD-MOLDING COMPOUNDS

Their relation to coal:

The binder used in many cold-molding compounds is coal tar pitch.

SYNTHETIC RUBBER

Its relation to coal:

The synthetic rubber ingredient, styrene, is derived from benzene, recovered from coke oven light oils.

NYLON

Its relation to coal:

Nylon is made from chemicals derived from benzene (recovered from coke oven light oil) and phenol (from coal tar).

Plastics statistics are now veiled in cloaks of military secrecy, but the last available figures show coal tar synthetic resins far outweighing non-coal tar resins.

The sketches on this page show many of the principal resins and the coal derivatives which are employed in them. Koppers mines coal, produces large quantities of these basic materials for many manufacturers of plastic materials, and has developed and built many of the plants in which they are recovered.—Koppers Company and Affiliates, Pittsburgh, Pa.

KOPPERS

The Industry That Serves All Industry

How to improve resistance of BUNA S to abrasion

Users have found that incorporation of Bardol* in Buna S (GR-S Rubber) results in superior abrasion-resistant properties in the compound. Shown by tests to be compatible with Buna S, Bardol processes readily and functions as a wetting agent and is also an effective plasticizer.

This coal-tar chemical promotes dispersion of sulphur and accelerators in the elastomer, thereby improving behavior and performance of the compounds.

Bardol also contributes to:

- **Greater resilience and lower hysteresis**
- **Higher tensile strength and elongation**
- **Low permanent and compression set**
- **Better flexibility and resistance to ply separation at low temperatures.**

For complete details wire or write

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK

Barrett

*Reg. U. S. Pat. Off.

ONE OF AMERICA'S GREAT BASIC BUSINESSES

FOR HEAVY DUTY PERFORMANCE

Continental "A"

THE PROVEN REINFORCEMENT

SEND FOR SAMPLES

ONE OF THESE GRADES IS YOUR BLACK: Continental "AAA" low heat generating, extremely easy processing · Continental "AA" low heat generating, easy processing Continental A medium cure, medium processing · Continental D standard.

FOR HIGH CONDUCTIVITY—Continental R-20, R-30, R-40, and a complete line of color blacks.

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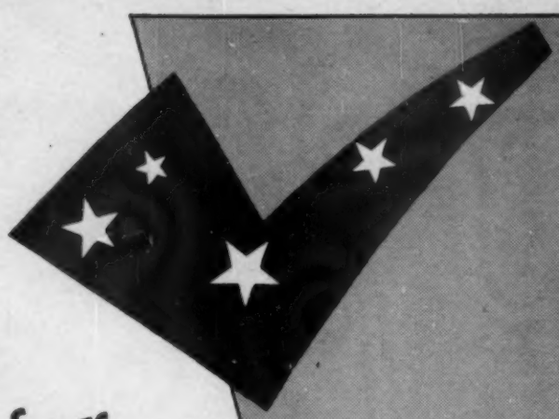
Sales Representatives: Ernest Jacoby & Co., Boston, Mass. · Marshall Dill, Los Angeles and San Francisco, Calif.

Redesigning and Rebuilding BANBURYS for Synthetic Compounding is Right Down Our Alley . . .



check your Banbury NOW . . . Our service is geared up to give you skillful rebuilding for quicker, better compounding with the new Synthetics . . . We know Banburys; we have specialized exclusively on Banbury rebuilding for years; we are fully equipped to meet any Banbury maintenance problem. Write, wire or phone us TODAY.

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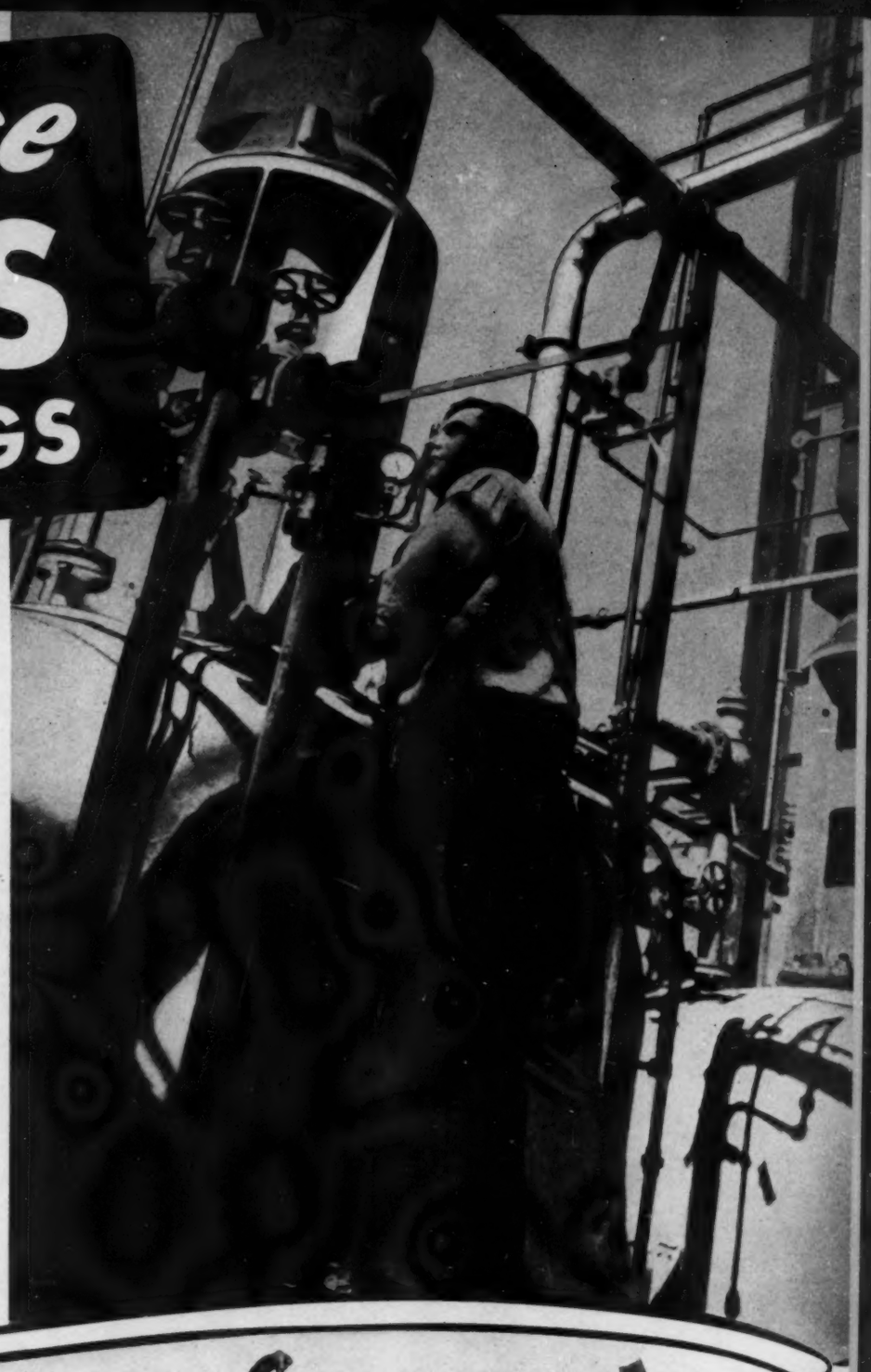
EXCLUSIVE SPECIALISTS IN BANBURY MIXER REBUILDING

They use TONS OF FITTINGS



In the construction and equipment of more than twenty-five plants for the production of synthetic rubber, literally TONS of Watson-Stillman Forged Steel Fittings were used. The urgency of this building program made it imperative that the plants operate at maximum efficiency as quickly as possible. W-S fittings, as well as such shop equipment as Hydraulic Jacks, Pumps and Wire Rope Shears, is playing a major role in this phase of the War Effort. The Watson-Stillman Co., Roselle, N. J.

For each of the W-S products shown here a special Booklet has been prepared. They contain detailed, practical information on the complete line. You may have copies of any or all on request.

WATSON-STILLMAN

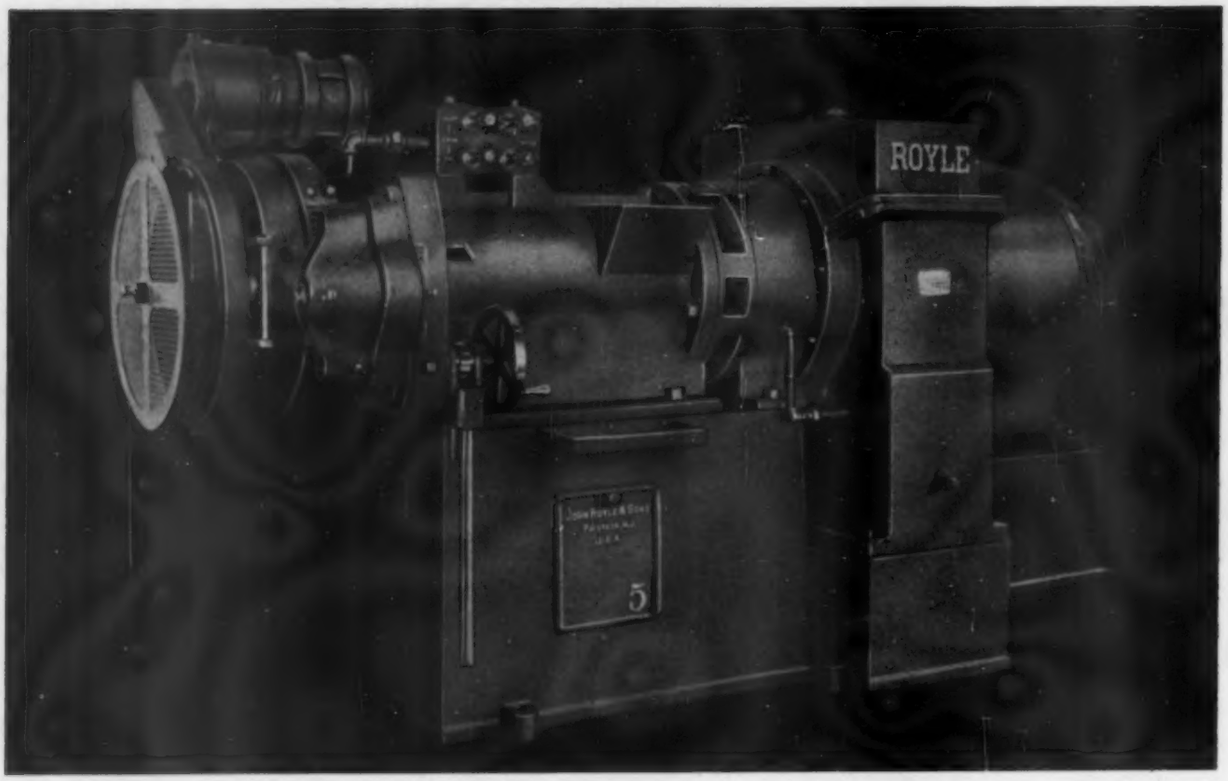
Distributor Products Division

Engineers and Manufacturers of Forged Steel Fittings, Valves, Wire Rope Shears, Pumps, Jacks and Hydraulic Equipment

For Victory ★★★ Let's all be Scrabbers

ROYLE STRAINERS

SPEED UP PRODUCTION



ROYLE MANUAL CONTROL BREAKS HEAD SEAL IN A FLASH

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The RUBBER AGE

VOL. 53, No. 4 JULY, 1943

A Tensiometer Stiffness Test for Elastomers at Low Temperatures

By B. K. GREEN, R. G. CHOLLAR, and G. J. WILSON

A method is described and experimentally illustrated for determining the stiffness characteristics of elastomers at low temperatures. Young's modulus at the temperatures involved can be calculated. The method is based on a bending test of a thin small sample through a small deflection. A Cenco du Nouy precision tensiometer No. 10402 makes such a test possible by the ease and accuracy with which the bending forces can be measured.

It has been shown that variations in thickness can be intercorrelated mathematically. Also the range of the instrument can be made to include stocks of widely different durometer by varying thickness and converting to a common scale or calculating Young's modulus. It has also been shown that Young's modulus as determined on the same material of varying thickness and moved through different deflections gave reasonably concordant results.

The equipment used is standard, readily available, and experimentally easy to apply. The few special parts needed are easily made. The information available from the results is detailed and accurate. The method gives promise for a more detailed study of change in modulus at any given temperature.

THE test to be discussed was originally devised to study the stiffness characteristics of carburetor diaphragm materials at low temperatures in air and immersed in various aviation motor fuels. These materials consisted chiefly of coated cloth. They have been studied before and after being subjected to various conditions of extraction and aging. A bending test was the logical approach to measure stiffness because of the cloth reinforcement and the similarity to diaphragm movement in carburetors. Because of the ease of application and the availability and ruggedness of the testing apparatus the test has since been extended to include the coating materials themselves; that is, the elastomers with no cloth reinforcement.

Stiffness against bending is directly proportional to Young's modulus. If dimensions of tested samples and deflection are standardized, the tensiometer readings can be used as a relative stiffness scale. In testing diaphragm materials all dimensions except thickness were standardized and the tensiometer readings were a direct measure of comparative stiffness of the diaphragm materials as used. In adapting the test to elastomer compounds it is desirable to standardize thickness also. The stiffness scale adopted is based on a thickness of forty thousandths of an inch. Since stiffness is directly proportional to the cube of the thickness, tensiometer readings taken on samples of other than standard thickness can be readily converted to the standard stiffness scale. It is possible to calculate Young's modulus directly from the available data.

EDITOR'S NOTE: The method discussed in this article was developed by the Chemical Research Department of the National Cash Register Co., Dayton, Ohio, with which department the authors are associated. The method has been submitted to the A.S.T.M. for consideration.

EXPERIMENTAL PROCEDURE

Description of Apparatus and Method

Relative stiffness of elastomers is determined by means of a bending test. The force required to bend a standard small sample through a given displacement is measured by means of a Cenco du Nouy Precision Tensiometer, Number 10402, ordinarily used for measuring surface tensions of liquids. The accompanying photograph shows the assembled apparatus as used for measuring stiffness of the samples in air at temperatures from 70° F. to minus 75° F.

The Tensiometer: The tensiometer is standardized in the usual manner to give surface tension readings in dynes per centimeter. Since the effective length of the platinum ring is eight centimeters, dial readings must be multiplied by eight to give the force in dynes. Two index marks placed on the tensiometer mirror are so spaced that the end of the tensiometer arm, after standardization of the length of this arm, moves through the standard displacement distance of 0.1875 in. when the index pointer moves from the lower to the upper mark. The arrangement of the mirror index marks are shown by Fig. 9. The length of the tensiometer arm varies with the calibration of the instrument and therefore the distance between the index marks to effect a movement of 0.1875 in. at the end of the arm is not standard.

The tensiometer wire must be twisted through a certain angle to raise the index pointer from one mark to the other. The reading corresponding to this angular displacement when the tensiometer is unloaded must be subtracted from all readings to give the true force involved. In order that tensiometer readings may be based on true zero as regards this force a mark may be placed on the tensiometer dial below the zero mark. The location of this mark may be easily determined by setting the tensiometer dial pointer at zero and turning the rear adjustment knob so that the arm pointer is at the upper index mark. The dial pointer is then moved downwards until the arm pointer is at the lower index mark. A line may be drawn at the position of the dial pointer and this line used henceforward as the initial balancing point instead of using the zero mark. The alternative is to balance at the zero mark and subtract the angular displacement from all readings.

Photo I—Assembled apparatus as used for measuring stiffness of samples in air.

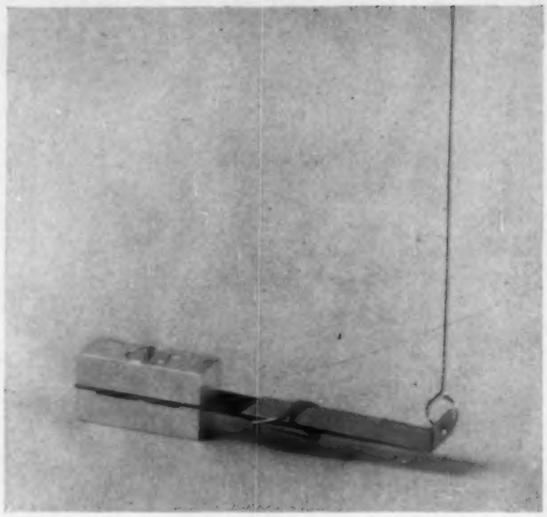


Photo II—Method of mounting specimen strip in the clamp and clip, explained in detail by Figures 1 to 7 (opposite page).

The range of the instrument is from zero to 800 dynes. High durometer elastomers may be too stiff to fall within this range for the standardized sample size. It is recommended in such cases to decrease the thickness of the standard sample and convert readings to the standard thickness scale.

The maximum force encountered in using the instrument is 2.9 grams or 2840 dynes. This is the force required to lift the clamp when the sample becomes too stiff to bend. It corresponds to a scale reading of 355. As the temperature is lowered a point is reached where the stiffness of the elastomer compound increases very rapidly. This point is considered as the stiffening point of the compound in question. If the stiffness of the sample causes the readings to run off of the scale before the stiffening point is reached a thinner sample should be run. That is, if the scale reading lies above 100 before stiffening occurs a thinner sample will bring the curve within the range of the instrument.

The effect of errors introduced by lifting the weight of the clip and using clips and wires which may vary in weight are negligible. The distance through which the sample moves is 0.48 cm.; that is, to lift a weight of one gram through this distance introduces an error of 0.5 dynes or 0.06 scale divisions. The clip spring and wire weigh approximately 1.3 grams, introducing an error of 0.08 scale divisions. This is well within the experimental error and may be neglected.

Specifications for Preparing and Mounting the Samples: Strips 0.25 in. wide and one inch long are cut from molded sheets 0.040 in. thick. This strip is mounted in the clamp and clip as shown by Figs. 1 through 7 and also by the second photograph. The sample exposed for bending is 0.25 in. x 0.25 in. x 0.040 in. One-half inch of the strip extends into the clip and one-quarter inch into the clamp. The manner

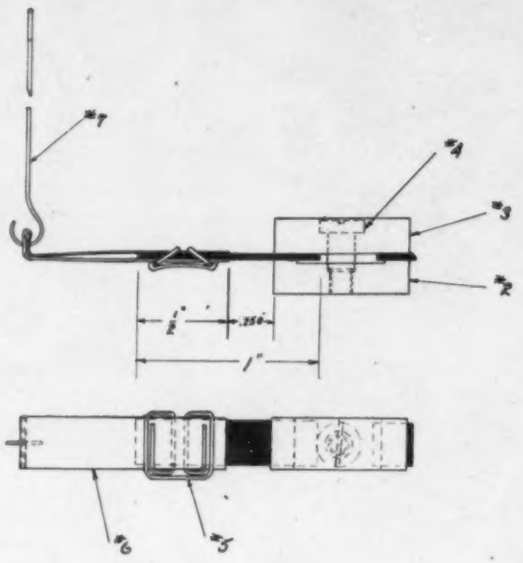
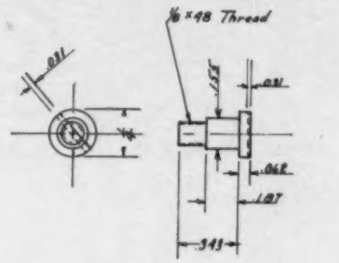
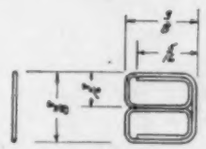


FIG. 1



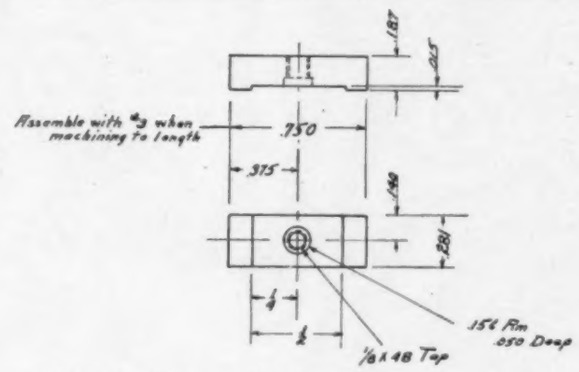
Material ~ CDS. Cadmium Plate

FIG. 4



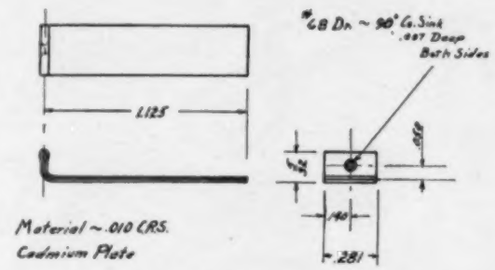
Material ~
.017-.020 Music Wire

FIG. 5



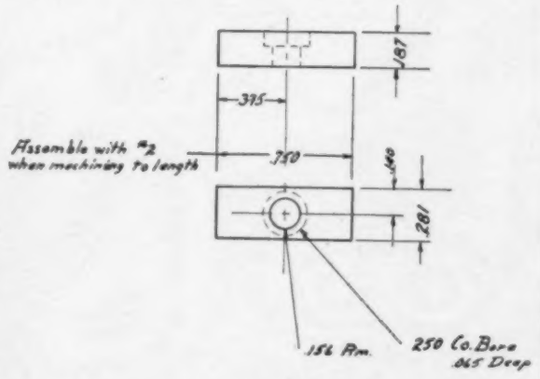
Material ~ CDS Cadmium Plate

FIG. 2



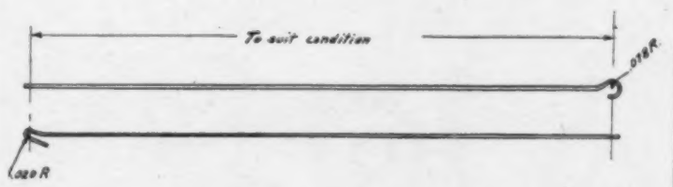
Material ~ .010 CRS.
Cadmium Plate

FIG. 6



Material ~ CDS Cadmium Plate

FIG. 3



Material ~ .017 Music Wire

FIG. 7

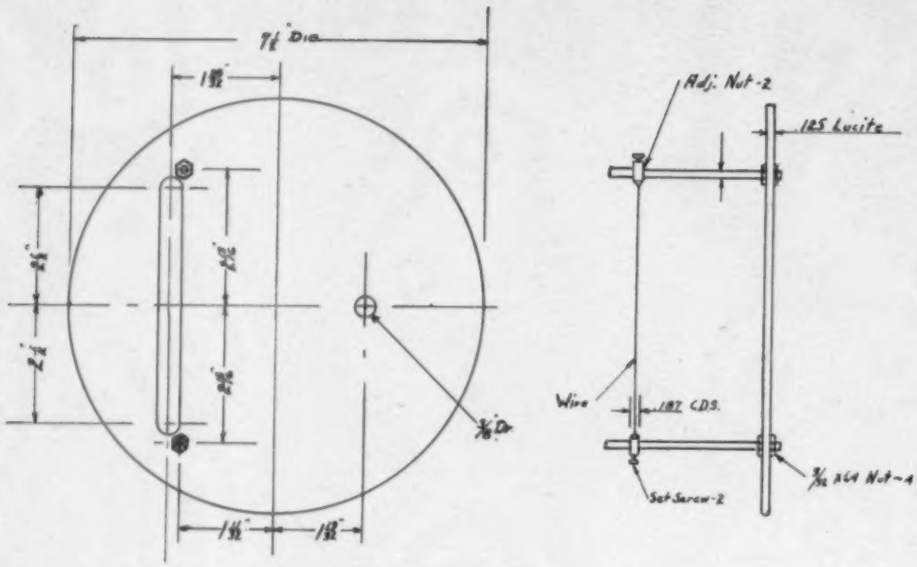


FIG. 8

of making the parts is also shown by the figures. All drawings are made to a scale of 2:1. The spring is easily bent from 0.017 in. music wire.

A snug fit is required at the clamping points that will not gap under the forces involved and will not be squeezed to a smaller cross section. The screw of the clamp must not be tightened beyond insuring a snug seat. The connecting wire is also made of 0.017 in. music wire, bent as shown, and approximately ten and one-half inches long. It must be straightened so that there is no bend or bow to cause change in length during a measurement.

The samples are allowed to stand twenty-four hours after compounding before molding into sheets. The molded sheets are allowed to stand twenty-four hours before being tested.

Temperature Control: The temperature control apparatus is shown in the first photograph. The outer container is a cylindrical pyrex jar 10 inches high and 10⅛ inches in diameter. (Central Scientific Co. 15202B). The inner container is a Griffin low form pyrex beaker of 3 liters capacity. It is approximately 5⅛ inches in diameter, and 7⅜ inches high. A circular steel plate 5 inches in diameter and approximately 0.056 in. thick is placed in the bottom of the beaker. The cover is made of a sheet of Lucite as shown in Fig. 8. The inner beaker is leveled and held clear of the bottom of the outer jar by three metal shims. The top of the inner beaker is about 1½ inches below the top of the outer jar.

The clamps are placed on the steel plate in the inner beaker. The connecting wires lead through the slot in the cover and are hung by their upper hooks to the wire on the cover studs. The latter wire is adjusted in height so that the samples are held in an approximately horizontal position. The heights of the tensiometer and outer jar are so adjusted that the hook at the end of the tensiometer arm is on a level with the horizontal wire when the arm is at the lower index mark. Thus in transferring the connecting wire to the tensiometer the sample is bent from the position in which it has been standing.

The inner jar must be weighted to hold it down in the cooling liquid. This may be accomplished in any manner but not by introducing a heavy metal mass into the inside of the beaker that may cause a temperature lag. In the photograph a 5-pound lead ring has been cast around the outside top lip of the beaker.

The cooling liquid consists of tri-butyl phosphate to which dry ice is added in small lumps. Tri-butyl phosphate was chosen because of its low volatility and lack of fumes which might influence the stiffness of the rubber samples. Also, it remains fluid at —75° F.

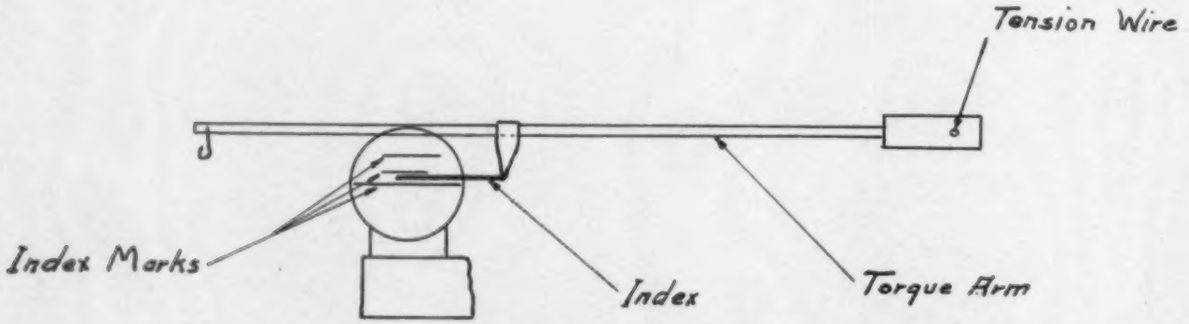


FIG. 9

and readily wets the dry ice serving as an efficient cooling medium.

The height of the cooling liquid is held about 4½ inches above the bottom of the pyrex beaker which is a depth of about 5 inches in the outer pyrex jar. This depth serves to give more uniform temperatures in the inner beaker. Approximately 4000 c.c. of tri-butyl phosphate are required to maintain this depth.

The samples are placed in the apparatus at room temperature and the first readings taken immediately. The temperature is gradually lowered by adding dry ice and readings are taken at room temperature, 45° F.; 30° F.; 15° F.; 0° F.; —15° F.; —30° F.; —45° F.; —60° F.; and —75° F.

The evolution of carbon dioxide from the dry ice keeps the apparatus full of dry gas excluding moisture from the apparatus. It is well to supplement this flow of carbon dioxide with a constant source of supply bubbling gas continuously into the cooling liquid in order that atmospheric humidity may not enter during periods of little or no dry ice gas evolution. Strong cross currents of air should, of course, be avoided.

The outer cooling liquid is stirred by means of a propeller stirrer. The stirrers shown in the illustration is Model Number Three made by Eastern Engineering Company. A glass propeller stirrer is also placed in the inner beaker to circulate the gas. The pitch of the propeller drives the air downwards. This propeller is driven at near top speed of the motor.

Tests were run to determine the uniformity of the temperature in the apparatus. This was found to be satisfactory as shown by Table I.

Method of Making Measurements: The height of the tensiometer, height of the outer jar, and length of connecting wires are so adjusted that the sample is held approximately in a horizontal position when the arm pointer is on the lower index mark. The horizontal wire on the cover studs is so adjusted that it holds the samples in approximately the same position.

Having hooked one of the samples to the end of the tensiometer arm, the dial pointer is set at zero or at the balance mark placed below the zero mark, depending on the method used to correct readings to a true zero scale. The rear adjusting knob is turned to bring the arm pointer to the lower index mark. The dial pointer is then moved till the upper index mark is reached. At least three readings are made and recorded for each measurement.

Temperature is controlled by adding dry ice to the cooling bath. A little experience enables the operator to add the ice in such quantities that the rate of fall

TABLE I—TEMPERATURE UNIFORMITY IN APPARATUS

Position of Thermometers	*Temperatures—degrees Fahrenheit*							
Bulb of thermometer placed in a close fitting hole in the clamp ..	46.4	35.6	16.2	4.1	—12.1	—25.6	—40.4	—55.8
Bulb of thermometer rested on metal plate at bottom of beaker	44.6	33.8	14.9	—0.4	—14.8	—29.2	—43.6	—58
Bulb of thermometer suspended just clear of the bottom	44.6	34.7	15.3	0.5	—14.4	—29.2	—43.6	—58
Bulb of thermometer suspended just one inch from the bottom .	45.5	35.2	15.8	2.3	—12.6	—27.8	—42.2	—55.8
Bulb of thermometer 5" above bottom of beaker near the level of the cooling liquid	46.0	36.2	14.0	2.3	—13.0	—28.6	—44.0	—58.4

TABLE II—VARIATION OF STIFFNESS WITH THICKNESS

For Compound C-24-R, Durometer — 58, 30′ Cure at 300° F.
Readings taken at two Displacements, $D_1 = 0.0938''$ and $D_2 = 0.1875''$.
Readings corrected to true zero by subtraction, 1.8 for D_1 and 3.5 for D_2.

Thickness	Displacement	Tensiometer Readings—R	Corrected R—Values—S	S Values Converted to 0.040" D_1	S Values Converted to 0.040" D_2	Young's Modulus #/sq. in.	% Deviation From Mean
0.020"	D_1	3.7, 3.8, 3.8 3.8, 3.7, 3.7	2.0	16.0		510	omit
	D_2	7.6, 7.7, 7.8 7.7, 7.6, 7.5	4.2		33.6	536	omit
0.032"	D_1	7.1, 7.2, 7.3 7.3, 7.4, 7.3	5.5	10.0		351	— 9.8%
	D_2	17.0, 17.1, 17.2 16.8, 17.8, 17.1	13.7		26.6	438	+11.3%
0.041"	D_1	14.0, 14.8, 14.1 14.8, 14.8, 13.5	12.5	11.2		351	— 7.9%
	D_2	32.3, 32.8, 31.9 32.8, 32.7, 31.4	28.8		25.8	412	— 4.9%
0.051"	D_1	22.8, 23.1, 22.8 23.0, 23.7, 23.1	21.4	10.3		330	—15.2%
	D_2	50.1, 51.2, 51.9 51.3, 52.1, 52.5	48.0		23.2	370	+ 5.9%
0.061"	D_1	46.5, 50.4, 48.3 48.8, 46.8, 48.5	46.4	13.1		418	+ 7.7%
	D_2	95.9, 101.1, 102.2 99.3, 102.2, 99.6	96.1		27.1	433	+12.6%

TABLE III—COMPOSITION OF COMPOUNDS USED FOR LOW TEMPERATURE TESTS

	C-32-R	C-28-R	C-24-R	C-36-R
Hycar OR-15	200	200	200	200
Zinc Oxide	6	6	6	6
Altax	3	3	3	3
P-33	60	60	60	150
Stearic Acid	1	1	1	1
Sulfur	3	3	3	3
Flexol 3G0	60	40	—	—
Tributoxy Ethyl Phosphate	30	—	—	—
Channel Black (WYEX)	—	—	—	50
Durometer	30	42	58	80

of temperature levels off so that sufficient time is available to measure six to ten samples with little change in temperature. Readings are taken at the room temperature, 45° F. and at 15° F. intervals to minus 75° F. The thermometer bulb is allowed to rest on the metal plate at the bottom of the inner beaker.

At lower temperatures the samples respond slowly to applied forces. This phenomenon has been called sluggishness. Readings must be taken slowly in this range. Repetition and accuracy are poor. The phenomenon nearly always precedes the stiffening point. Only one reading is recorded and a notation of sluggishness is made.

Time of Cooling: It is recognized that stiffening progresses with the time at which an elastomer sample is held at a given temperature. For purposes of comparative tests on diaphragm materials a fairly rapid rate of cooling was adopted. Such results give somewhat lower stiffness values than would longer time periods of cooling. The results are of value, showing what is to be expected in high altitude flying for short periods of time, and also for comparison purposes. In the ultimate analysis of diaphragm materials longer time intervals must be used. Also, in adapting the test to elastomers time is a variable that must be considered. The tensiometer method is easily and readily adaptable to a time study except that a better means must be used to maintain constant low temperatures than is available with the apparatus herein described. This subject is to be further investigated.

The elapsed time of making a run from room temperature to —75° F. is six to eight hours. Forty minutes to one hour elapses between each 15° drop in temperature. The dry ice is so added that the temperature falls rapidly at first and then slowly approaches the desired temperature at which measurements are to be made. This procedure has given uniform and reproducible results.

Experimental Demonstration of Method

Several experiments, data and graphs are submitted to illustrate the tensiometer method. Experiment 1 is designed to show the relation that thickness bears to stiffness characteristics. Experiment 2 illustrates the low temperature stiffness characteristics of a number of compounds varying in durometer and plasticizer content. Experiment 3 shows the agreement obtained by two different methods of determining Young's modulus.

Experiment 1—Thickness: A compound designated as C-24-R was prepared having the following composition:

Hycar OR-15	200
Zinc Oxide	6
Altax	3
P-33	60
Stearic Acid	1
Sulfur	3

TABLE IV—TEMPERATURE-STIFFNESS DATA FOR DISPLACEMENT OF 0.1875"

Temperature	C-32-R 30 Durometer 0.038" thick		C-28-R 42 Durometer 0.039" thick		C-24-R 58 Durometer 0.0395" thick		C-36-R 80 Durometer 0.040" thick		C-36-R 80 Durometer 0.020" thick	
	S	S40	S	S40	S	S40	S	S40	S	S40
78.8° F.	9.3 9.1 9.4	10.3	17.1 17.0 16.9	18.3	29.5 29.6 28.9	30.4	Off Scale	—	21.7 21.8 21.9	174.4
45° F.	9.4 9.6 9.6	10.7	18.0 18.3 18.4	19.6	34.3 34.3 34.6	35.7	—	—	37.1 37.9 37.3	299.3
30° F.	10.8 10.4 10.2	11.7	20.5 20.3 19.9	21.8	39.5? Sluggish	41.0	—	—	44.5? Sluggish	203.2
15° F.	11.3 11.6 11.4	12.8	21.6 20.8 21.8	23.1	Stiff	—	—	—	Stiff	—
0° F.	11.8 12.1 13.0	13.8	25.4? Sluggish	27.4	—	—	—	—	—	—
—15° F.	13.9 13.5 13.5	15.2	39.0 Very Sluggish	42.1	—	—	—	—	—	—
—30° F.	18.7? Sluggish	21.0	—	—	—	—	—	—	—	—
—45° F.	29.5? Very Sluggish	33.1	—	—	—	—	—	—	—	—
—60° F.	Stiff	—	—	—	—	—	—	—	—	—

This compound had a Shore durometer of 58. It was molded into sheets and cured at 300° F. for 30 minutes. Five different thicknesses were molded from 0.020 in. to 0.060 in. The actual thickness of the samples tested are tabulated in Table II. After compounding, the material was aged at room temperature 24 hours before molding. After molding it was again allowed to stand 24 hours before testing.

The S values are corrected tensiometer readings. They are directly proportional to the force required to displace the sample through the distance chosen. The samples are of standard dimensions except thickness. The thickness has been varied from 0.020 in. to 0.060 in. Stiffness is directly proportional to the cube of the thickness.

$$S = kT^3$$

On this basis all S values have been calculated to a common thickness of 0.040 in. and designated S40. The S40 values are directly proportional to Young's modulus provided dimensional and displacement terms remain constant. The S40 values for different displacements cannot be used for direct comparisons. The values for Young's modulus as calculated by the method discussed under theory are of course independent of displacement. For any given displacement the S40 values are a direct comparative measure for stiffness. The graphs are plotted on this basis.

S values, S40 values and Young's modulus are tabulated in Table II. The S40 values for D_1 and D_2 should be compared separately. The values for the 0.020 in. sample should not be considered because tensiometer readings are so low that frictional forces and other experimental errors cause too great a percentage error.

The per cent deviations from the mean are calculated for the eight values of Young's modulus obtained on samples of varying thickness and moved through

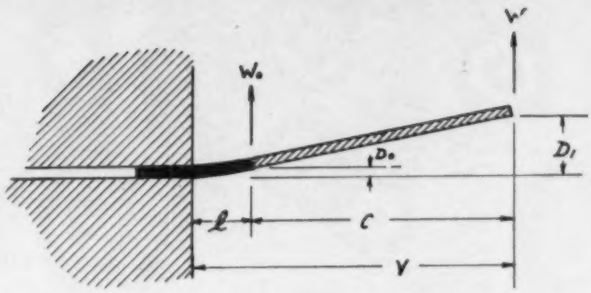


FIG. 10

different displacements. It is felt that the maximum deviation of 15.2% is not excessive for a method which varies as the cube of both length and thickness. Also variations are introduced by the samples themselves being molded to different thicknesses.

This experiment shows that stiffness varies directly as the cube of the thickness and substantiates the practice of reducing all readings to a common thickness.

Experiment 2—Durometer and Low Temperature: This experiment shows the low temperature stiffness characteristics of several compounds of varying durometer and composition. Table III gives the composition and durometers of the compounds investigated.

Table IV gives the tensiometer readings for a displacement of 0.1875 in. during the run and also the calculated S40 values. Table V gives the same for a displacement of 0.0938 in. The readings are based on true zero by having balanced the tensiometer at an appropriate mark for the deviation in question. These marks are placed on the dial below the zero mark as previously described.

TABLE V—TEMPERATURE-STIFFNESS FOR DISPLACEMENT OF 0.0938"

Temperature	C-32-R 30 Durometer 0.038" thick		C-28-R 42 Durometer 0.039" thick		C-24-R 58 Durometer 0.0395" thick		C-36-R 80 Durometer 0.040" thick		C-36-R 80 Durometer 0.020" thick	
	S	S40	S	S40	S	S40	S	S40	S	S40
78.8° F.	3.4 3.4 3.3	3.7	6.1 6.1 6.0	6.5	13.3 13.6 13.7	14.1	71.4	71.4	9.3 9.3 8.7	76.0
45° F.	3.3 3.3 3.5	3.7	6.4 6.4 6.6	6.9	16.7 16.3 16.1	16.9	—	—	18.9 19.1 18.8	151.2
30° F.	3.8 3.7 3.6	4.1	8.3 8.4 8.1	8.9	19.5? Sluggish	20.2	—	—	25.4? Sluggish	203.2
15° F.	4.1 4.0 4.0	4.5	9.2 8.6 9.8	9.9	Stiff	—	—	—	Stiff	—
0° F.	4.5 4.5 4.7	5.1	12.6? Sluggish	13.6	—	—	—	—	—	—
—15° F.	4.8 4.7 4.8	5.3	20.4? Very Sluggish	22.0	—	—	—	—	—	—
—30° F.	8.9 Slug- gish	10.0	Stiff	—	—	—	—	—	—	—
—45° F.	9.1 Very Sluggish	10.2	—	—	—	—	—	—	—	—
—60° F.	Stiff		—	—	—	—	—	—	—	—

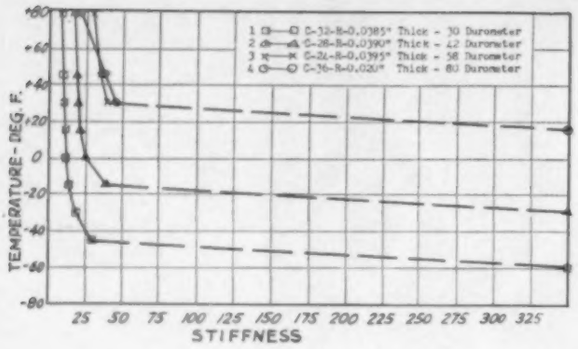


Chart I

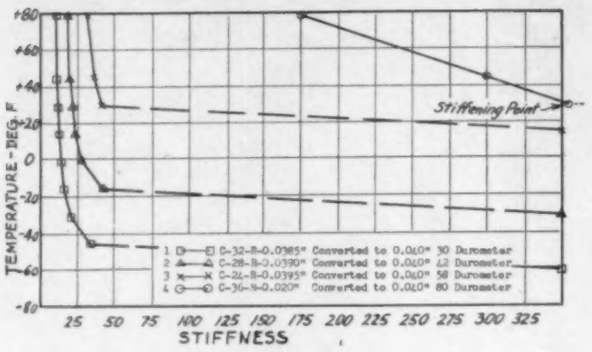

Stiffening Point
1 C-32-R-0.0385" Converted to 0.040" 30 Durometer
2 C-28-R-0.0390" Converted to 0.040" 42 Durometer
3 C-24-R-0.0395" Converted to 0.040" 58 Durometer
4 C-36-R-0.020" Converted to 0.040" 80 Durometer
TEMPERATURE - DEG. F
+80 +60 +40 +20 0 -20 -40 -60 -80
25 50 75 100 125 150 175 200 225 250 275 300 325
STIFFNESS

Chart II

Temperature-Stiffness Curves in Air
Elastomers of Various Durometers—Displacement 0.1875"

Compound C-36-R of 80 durometer was too stiff to be measured in the same thickness as the other compounds. A sample was therefore molded to 0.020 in. thickness. For the 0.040 in. thickness only one reading could be obtained. This was 71.4 for D_1. The corresponding reading on the 0.020 in. sample gave a calculated reading reduced to the 0.040 in. thickness of 76.0 This is an example of how such situations can be handled. The thickness must be such that the stiffening point occurs within the range of the instrument. On the other hand it must not be so thin that the readings are very small because of experimental error.

Charts 1 and 2 show the data plotted for a displacement of 0.1875 in. Chart 2 should be used for comparisons since all readings are based on a common thickness. Charts 3 and 4 give the same information for a displacement of 0.0938 in.

Experiment 3—Determination of Young's Modulus by Two Different Methods: Young's modulus for C-24-R was determined by the clip method described in this report and also by bending a longer sample having no clip attached.

For a sample 1.203 in. long, 0.25 in. wide and 0.041 in. thick by bending the end with no clip attached through a distance of 0.0938 in., Young's modulus gave a value of 380. 4.9 is the corrected tensiometer reading. Young's modulus for the clip method gave a mean value of 388. See Table II.

THEORETICAL DISCUSSION

Young's Modulus

Young's modulus by bending is much more complicated to handle mathematically than Young's modulus by tension. It is, however, easier to handle experimentally.

The clip method used and described here may seem unnecessarily complicated but it has several experimental advantages. It enables a small force easily and accurately measured by a tensiometer to produce a large bending moment on a small sample. This large bending moment moves through a small deflection which deflection is multiplied by the clip to increase the accuracy of measurement. Also, the weight of the clip bends the sample downwards and the tensiometer measures the release of internal stresses in the sample in the same direction and manner as though the stresses were being added to the sample. Thus, as the sample moves through the neutral point of no stress, the tensiometer continues to measure added stresses, in the same direction as it formerly measured released stresses. This makes it unnecessary to accurately position the sample in a horizontal or zero stress position before starting to take a reading. It eliminates to a large extent interference by natural material curl of a sample. Of course, these considerations hold only over small deflections and provided in this range that the force varies directly as the deflection. That this is approximately true has been shown ex-

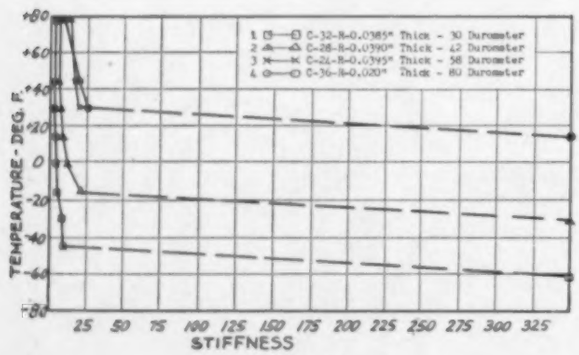


Chart III

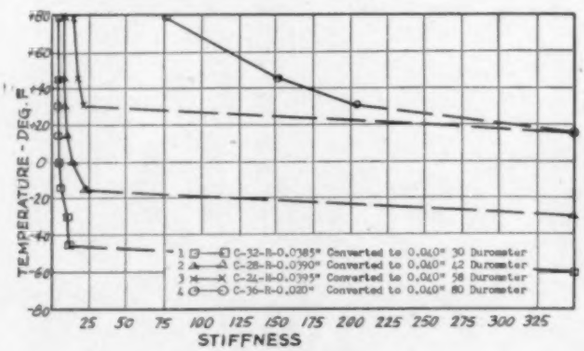

1 C-32-R-0.0385" Converted to 0.040" 30 Durometer
2 C-28-R-0.0390" Converted to 0.040" 42 Durometer
3 C-24-R-0.0395" Converted to 0.040" 58 Durometer
4 C-36-R-0.020" Converted to 0.040" 80 Durometer
TEMPERATURE - DEG. F.
+80 +60 +40 +20 0 -20 -40 -60 -80
25 50 75 100 125 150 175 200 225 250 275 300 325
STIFFNESS

Chart IV

Temperature-Stiffness Curves in Air
Elastomers of Various Durometers—Displacement 0.0938"

perimentally. It is therefore unnecessary to turn the sample over and measure it in two directions.

Also, for the small sample warping and curling forces encountered on immersing rubber samples in liquid media introduce smaller experimental error than if the clip were eliminated and larger samples were used.

For a simple cantilever having a concentrated force applied at an intermediate point the deflection produced at the point of the force, D_o, and at the end of the cantilever, D_1, are given by the following relationship:

$$D_o = \frac{W_o L^3}{3\,EI}$$

$$D_1 = \frac{W_o L^3}{3\,EI}(2L + 3c)$$

See Fig. 10 for symbols. L is the length of the sample between the clamp and clip; c is the length of the clip; E is the modulus of elasticity; I is the moment of inertia of the cross section of the sample:

$$I = \frac{bT^3}{12}$$

b is the width of the sample; and T is the thickness of the sample. All dimensions are in inches, all forces in pounds, and all stresses in pounds per square inch.

Referring to Fig. 10, W_1 is the force measured and D_1 is the measured deflection. The relationship of W_1 and W_o can be determined by the moments about the clamp:

$$W_1 V = W_o L$$

$$D_1 = \frac{W_1 L V}{6\,EI}(2L + 3c)$$

$$E = \frac{W_1 L V}{6\,D_1 I}(2L + 3c)$$

Young's modulus can be calculated from the last equation. The weight of the clip may be neglected; it has only a vertical component which remains the same throughout the deflection. The deflection is so small and the length of the connecting wire so great that the horizontal component may be neglected. Also, the errors introduced by raising the weights involved are small and may be neglected.

The Stiffening Point

The stiffening point may be defined as that temperature at which a large change in modulus occurs. In this report it is the point at which the temperature stiffness curve makes a sharp turn. On the graphs from this point a dotted line is used indicating that the next plotted point is off the scale of the graph and is very large and indeterminate by the tensiometer method.

Simple Splicing Operation Saves Rubber Hose

SKILLED craftsmen at the Canadian Pacific Railway's Angus Shops in Montreal, Canada, are making a major contribution to the "stretching" of available rubber in reclaiming the hose used in brake and signal connections it was recently announced. In the short time the program has been in effect, as the newest phase of the company's Dominion-wide conservation campaign, five and one-half tons of rubber have been saved through the reclaiming of 5,394 air hose and 1,058 signal hose.

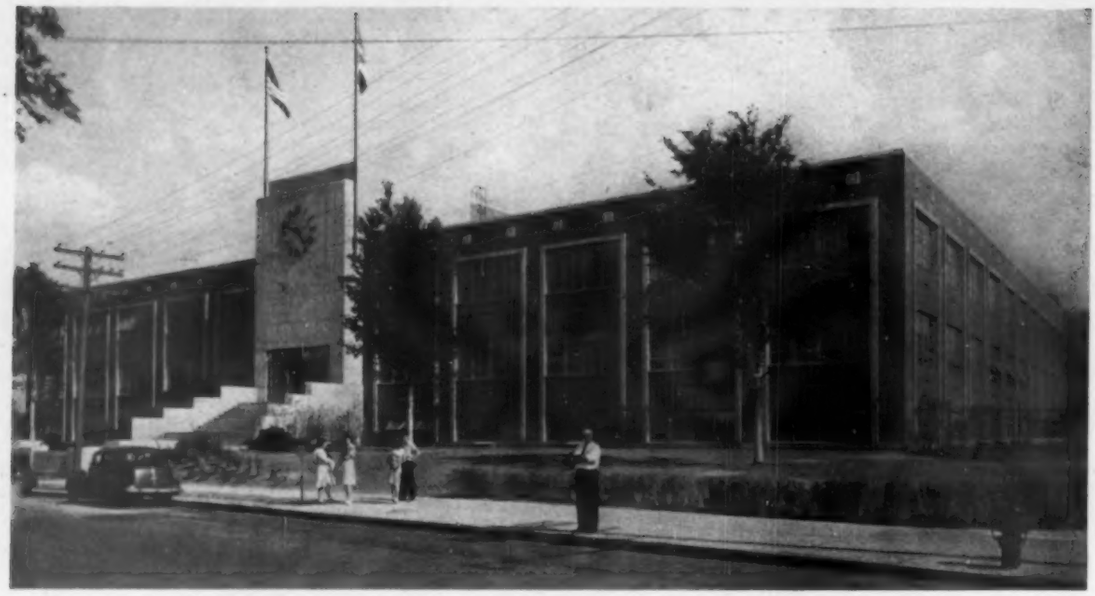
Continuance of the rubber reclamation, so vitally important since the Japanese seized the world's rubber in Malaya and the East Indies, will mean a sizeable addition to the stock pile made available for war machines. Over the year it is estimated there will be a saving of 30% in the rubber hose used on the 84,139 pieces of the company rolling stock—with locomotives, passenger equipment, freight and work cars all included in that total.

The process used at Angus Shops to save rubber is a simple splicing operation in which the good sections of worn and burst hose are spliced to form connections which meet all safety requirements and are equal in performance to the one-piece connection. Details of the program were recently given by H. B. Bowen, chief of motive power and rolling stock, under whose direction the work has gone forward. Indicative of the thoroughness with which the job was done was the development of a special machine at Angus Shops to speed up the preparation of the hose sections for splicing, with this work having been under H. R. Naylor, works manager.

The reclaimed hose connection is made by cutting two good pieces from worn connections and then joining them with a malleable iron adapter fitted into one end of each section. Clamps on the outside of the hose at the place where the adapter has been inserted complete the operation.

The machine which speeds up the operation is a cutter, operated by air and with a measuring device to guarantee accuracy, along with a self-locking clamp. Before the machine was developed, the worn sections were sawed out of the hose being prepared into a mitre box. An improved method was the introduction of a vise clamp to hold the hose steady and the application of lubricant to ensure a clean cut, both of these features being incorporated in the machine. The knife blade used on the mechanical cutter is made from an old hack saw blade and other used material found a place in the machine in following the C.P.R. policy of getting the most out of all possible materials in wartime.

Chief advantages of the machine are the improved work it turns out and the labor saved, with the latter an important consideration in these days of diminished manpower.

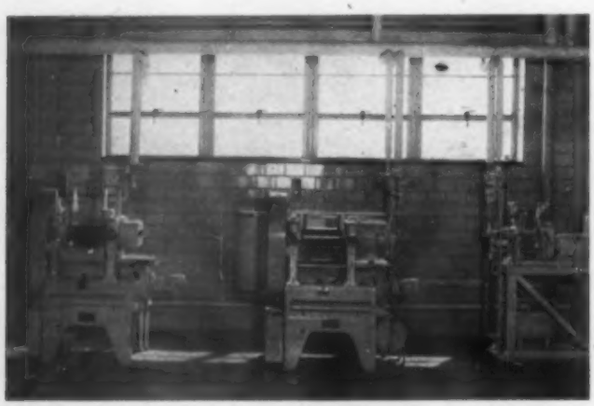


View of the new and modern Goodyear Research Laboratory in Akron

Goodyear's New Research Laboratory

BUILT and equipped at a cost of $1,325,000, the new research laboratory of the Goodyear Tire & Rubber Co., which was formally dedicated last month, contains the latest and most advanced instruments available for research in rubber, synthetic rubber, plastics, aircraft, and allied fields. Located in Akron, the laboratory, headed by Dr. L. B. Sebrell, manager of the company's research and new products division, is two short blocks away from the main offices of the company.

The laboratory building, three stories in height, is of reinforced brick and stone construction. It is simple yet handsome in outward appearance, while its design and arrangement embody the most modern principles of utility. A wide flight of stone steps leads to the central entrance which is in a clock tower. Along the edges of the tower and the other walls, there is a series of stone symbols taken from ancient alchemy, representing air, fire, earth and water—the four basic elements on which, according to the Greeks, the whole universe was built. There are also symbols for sulfur, mercury and salt—the three elements added by the Arabians, as well as alchemical symbols for a number of metals and other substances.



These rubber mills and washers are located on the ground floor of the new laboratory.

The structure is in the form of a "U", the front section being 225 feet long and 50 feet wide. Architecturally, this front section is divided into two by the central clock tower. The arms of the "U" extend backward from this section, one arm being 140 feet long and 72 feet wide, and the other 200 feet long and 72 feet wide. All three floors of the building represent 74,000 square feet of floor space in all.

Five large laboratories, suitable for heavy machinery, are located on the ground floor of the new laboratory. These, for the present, will be used for studies of rubber processing, plastics processing, film casting, and allied tests. This floor also contains a machine and work shop, a room for building services, and a series of smaller rooms that can be used flexibly as shops or laboratories.

Eleven offices are provided on the second floor for managerial executives. In addition, there is a conference room on this floor, as well as rooms for stenographic and clerical work. A group of special laboratories devoted to physics, x-ray studies, and microscopic research are also located on this floor. The third,

or top, floor contains, in addition to the library, a dozen laboratories devoted to analytical and organic chemistry, including one bomb-proof laboratory.

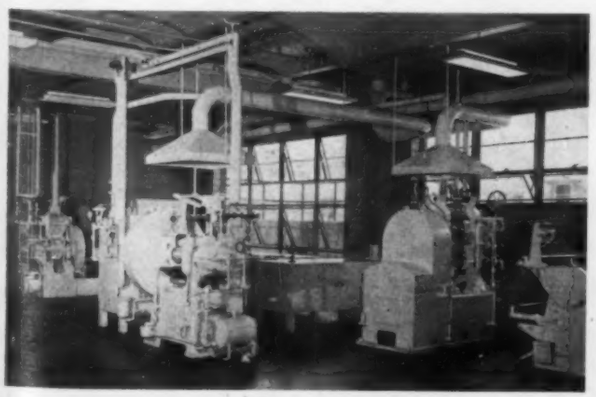
Of special interest in the new laboratory is the farther end of the longer arm of the "U". This end constitutes a single room, three stories high. It is 60 feet long and 72 feet wide and can be used for large-scale equipment or pilot plants. At present, a semi-commercial coating machine, with tower, is installed in this room, along with some other equipment, but the room is sufficiently adaptable so that semi-commercial production of a variety of products can be launched at any time.

New "Cold Room" Is Special Feature

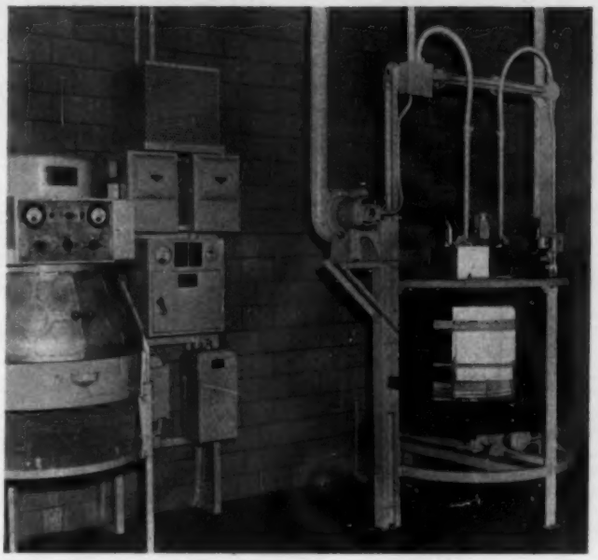
Also of special interest is a "cold room" in which temperatures can be reduced to a maximum of 100 degrees below zero. The maximum encountered anywhere in the stratosphere, incidentally, is only 65 to 72 degrees below zero. Close to 1500 square feet of space for testing tires, airplane equipment and other materials are provided in this room, which supplements another large chamber in which temperatures can be reduced to as low as 40 degrees below zero and in which similar tests may be conducted. Both of these "cold rooms" will be outfitted with the latest equipment of all kinds for low temperature tests. In addition, specially-developed instruments will enable the development engineers outside the "cold rooms" to maintain checks at all times on conditions within the rooms and on results of tests being run.

As stated, the equipment already installed in the various laboratories, forerunners of additional apparatus to come, includes many of the latest research instruments available. Among them are an RCA electron microscope and a Bausch and Lomb analytical spectrograph. Under construction is an infra-red spectrometer, conceived and designed by Goodyear chemists. Other devices include x-ray machines of various types, optical microscopes, and the vast array of apparatus needed for physical and chemical investigations, including implements for microanalysis, electrochemographs, hydrogen ion concentration of pH meters, and the like.

The electron microscope is the newest and one of the most powerful research tools of science. It employs a beam of electrons instead of light rays and



Battery of plastic equipment which includes a Banbury, two-roll mill and four roll calender.



An Atlas Electric Fade-Ometer (left) and a National Carbon Accelerated Weathering Unit (right) are installed in the laboratory.

magnifies approximately 100,000 times as compared with the 2,000 time magnification of the best optical microscope in use today. Studies with this new instrument have already revealed that synthetic latex consists of particles of smaller average sizes and greater uniformity, the average size of a particle in natural rubber latex being 10 millionths of an inch and in synthetic rubber latex only 2.5 millionths of an inch. The particles of natural rubber latex range in size from as little as 4 millionths of an inch to as much as 160 millionths, while on the other hand the range of the synthetic particles is only from 0.8 to 7.2 millionths of an inch.

Description of Special Apparatus

Important to the researches conducted in the new laboratory are the results anticipated from the use of both the analytical spectrograph and the soon-to-be-completed infra-red spectrometer. The former not only identifies traces of chemical elements so slight that the most careful chemical analysis fails to detect their presence, but also differentiates the isotopes of any chemical element, atoms which differ from each other only by reason of their atomic weight. This is accomplished by rendering the substance under study incandescent and spreading out its light as a "rainbow" or spectrum, each chemical element being revealed by its characteristic spectrum lines.

The infra-red spectrometer being built is one of the newest research instruments in organic chemistry. With the aid of photo-electric equipment, it registers the spectrum lines that occur in the so-called infra-red region, the region of heat waves beyond the red end of the visible spectrum. It is basically a method of identifying organic molecules and often accomplishes in a few minutes tasks that normally take hours.

The rubber and plastic equipment is concentrated in laboratories on the ground floor. The rubber equipment at present includes two laboratory rubber mills

—one Thropp 2 x 6 inch mill and one National Rubber 6 x 12 inch mill—and one National Rubber 6 x 12 inch washer mill. There are three platen presses, one French Oil Mill 20 x 20 inch press and two special presses built by Goodyear, one small one, 5½ x 15 inch, and a larger one, 20 x 32 inch.

The plastic equipment currently installed includes a Farrel-Birmingham #00 Banbury, an 8 x 16 inch mill, and an 8 x 16 inch roll calender. In addition, there is a Reed-Prentice No. 10 D-6 injection molding machine and a Plastic Wiley Mill No. 1.

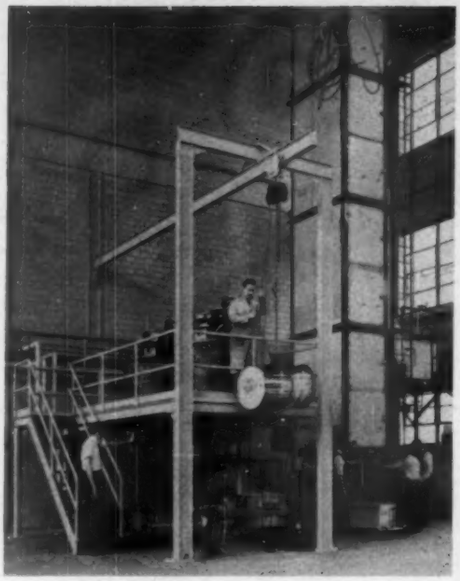
Testing equipment for rubber and plastics in the new laboratory includes an Atlas Electric Fade-Ometer, for determining the fastness to light of dyestuff and dyed fabrics, the temperature of which is automatically controlled; a National Carbon Model X-1-A accelerated weathering unit, which produces results which are closely correlated with those obtained under natural conditions, but requiring only a fraction of the time; a Carver 6 x 6 inch platen press; and two Scott testers.

Additional laboratory equipment and testing apparatus will be installed from time to time. The apparatus listed here, it should be noted, applies only to rubber and plastics. The laboratory is also equipped with numerous machines for the testing of additional products, including metals.

The present research personnel of the Goodyear Research Division consists of approximately 125 chemists, physicists, engineers, and metallurgists, along with some 400 others who spend full time on field work. The new laboratory, when all of its equipment is installed, will accommodate double that number of technologists, with necessary clerical and other assistants.

For the present, the laboratory, like every other Goodyear facility, will be devoted to the task of winning the war. Objectives set up for the laboratory for the immediate future, announced at the dedication ceremonies, are nine in number, as follows:

Progressively and continuously to improve the quality, value, and serviceability of rubber tires of all kinds; to specialize in the development and perfection of synthetic rubber; to perfect further the knowledge and technique of making transparent films for use in packaging foods; to develop new types of resins having value as protective coatings, molding materials, or as substitutes for rubber; to discover new types of cord suitable for use in the construction of tires and to improve present cords made from rayon, cotton, and other similar materials; to advance the design of aircraft, both heavier-than-air and lighter-than-air; to improve adhesives for use in attaching rubber and synthetic rubber to metals of all types; to evolve procedures for preventing corrosion of magnesium and to achieve improvements in the metallurgy of magnesium and aluminum; and to study plastics that may be adapted in various circumstances in place of rubber.



View of the coating machinery currently installed in the large testing room.

The Electron Microscope, one of the most powerful tools of modern science.

Use of Rubber Nameplates

NAMEPLATES featuring color and stretch—which save application time and labor and permit the use of full color for greater visibility—are now being used in increasing quantities by manufacturers of rubber war items as well as footwear. Not only trademarks, but indicators, serial numbers, instruction data and a host of other identification matter are being produced by the Elasti-Cal method, according to The Meyercord Co., Chicago, makers of the patented identification process.

Application of Elasti-Cals is made quickly, either in the mold or by cold methods. In addition to application efficiency, they are said to adhere so satisfactorily to the surface as to become actually a part of the product. They are made of sturdy, elastic composition employing only 1/20th the rubber required in conventional rubber labels. Elasti-Cals insure complete elimination of rough edges, and stretch with the product. Any color or design can be reproduced. They last virtually for the lifetime of the rubber product.

Some Observations on the Flex-Cracking Characteristics of GR-S (Buna S) Compounds

By JOSEPH BRECKLEY

Rubber Laboratory,
Titanium Pigment Corp.,
New York, N. Y

PROBABLY the most serious defect of GR-S rubber is its poor resistance to flex cracking and much research has been conducted in an effort to improve this characteristic. Among the many tests employed in the study of rubber is the bend flexing method using the De Mattia apparatus as described in A.S.T.M. Method D430-35T. However, when GR-S vulcanizates were flexed according to the standard procedure erratic results were obtained.

In an effort to secure more reproducible test data a study was made of the crack growth that proceeded from small nicks made initially in the surface of the sample. Some difficulty was encountered in making a nick of uniform dimensions until a procedure was developed whereby a pin hole about .025 inches in diameter and approximately .05 inches in depth was made in the center of the grooved surface of the test piece. The hole was made by a pointed piece of steel, shielded so that it could penetrate into the sample only to a constant depth. When the samples were prepared in this manner the crack growth extending from the hole during flexing was fairly uniform and the results were reproducible within rather close limits.

Many different compounds were flexed in accordance with this technique at room temperature and it was noticed that the rate of crack growth was affected particularly by the state of cure and the degree of loading of the stocks; the tighter the cure and the higher the loading, the more rapid the crack growth. The choice of accelerators and sulfur ratios apparently had little effect provided the same state of cure was attained in each case.

Since GR-S rubber is more brittle at elevated than at room temperatures it was decided to conduct tests at 100° C. For this purpose the De Mattia apparatus was enclosed within an insulated case containing electric strip heaters and an electric fan to provide adequate circulation of the heated air.

Many compounds were tested at the higher temperatures and it was discovered that some which had not cracked too badly in 50,000 flexes at room temperatures failed completely in about a tenth of the time when flexed at 100° C. In general the results at 100° C. confirmed those obtained at room temperature.

In the course of experimentation it was discovered

Note: This article is based on a paper delivered by the author before the New York Group, Rubber Division, A.C.S., in New York City on June 11, 1943.

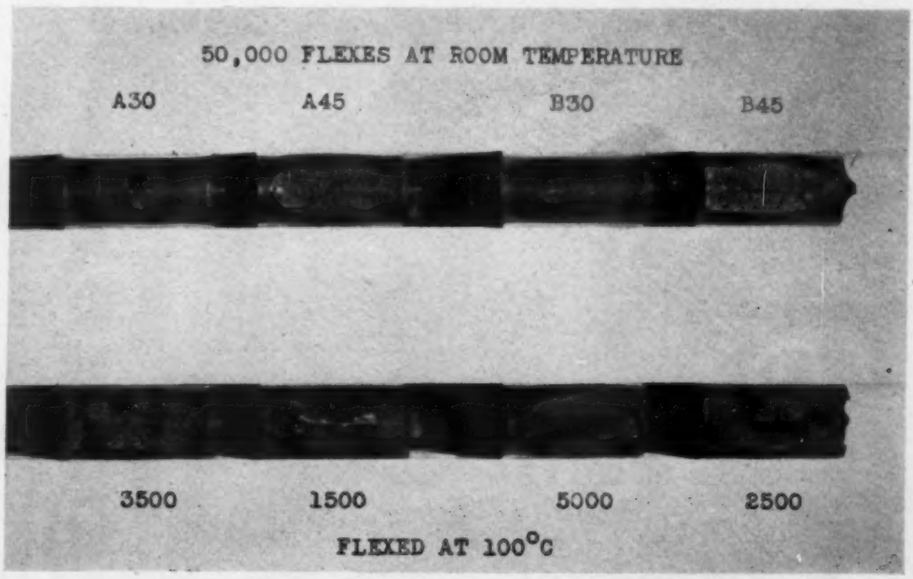


Fig. 1.

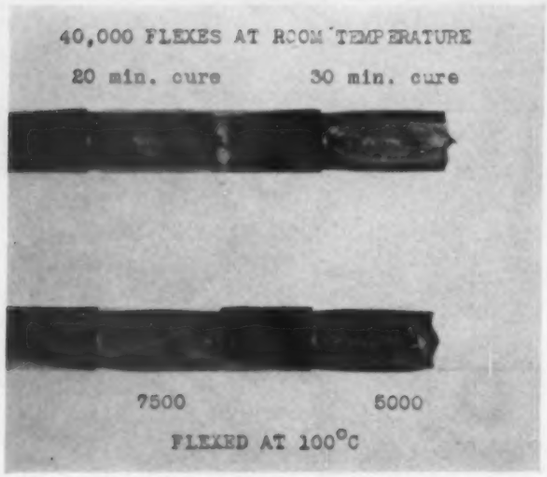


Fig. 2.

that the addition of 10 to 20 parts by weight of "hard clay" to a normal GR-S carcass or tread would result in a decided improvement in the flex life of the stocks. This improvement was evident also when the clay was added to Perbunan or natural rubber stocks. The development is illustrated in the accompanying photos.

The influence of the state of cure and the temperature of flexing on the flexing life of a medium-loaded GR-S stock that might be used as a carcass stock is illustrated in Fig. 1. Compound A, in this case, contains 15 parts of easy processing channel black and 10 volumes of titanium dioxide, in addition to vulcanizing agents and softener. Compound B is the same as A except that the titanium dioxide was eliminated and the channel black increased by 10 volumes. The increase in the cracking of each compound when flexed at room temperature as the cure is advanced from 30 to 45 minutes is quite evident, as is the greatly accelerated rate of cracking when the flexing temperature is raised.

Fig. 2 shows the effect of the state of cure and temperature of flexing on the cracking rate of a GR-S tread stock containing 50 parts of channel black. Here, again, the same rate of cracking is noted when the cure is advanced from 20 to 30 minutes at room temperature.

The improvement in flexing at 100° C. induced by the addition of a small quantity of clay is illustrated in Fig. 3. Compound 1091-A contains 15 parts of channel black and 10 volumes of titanium dioxide while Compound 1137 is an equivalent stock with the exception that the titanium dioxide has been replaced with an equal volume of clay. It will be noted that at the 30 minute cure Compound 1091-A has cracked entirely across in 3500 flexes, whereas Compound 1137 has cracked only about one-third as much in 95,000 flexes. The 1091-A sample has cracked almost completely through, while the crack in the other sample extends only as deep as the pin hole. Similarly, the 1137 stock is decidedly superior at the 45 minute cure.

Fig. 4 represents a comparison between two GR-S tread stocks, Compound A containing 46 parts of channel black and B the same stock plus 10 volumes of clay. In fact, Compound B was formulated by adding the clay to A. It will be seen that Compound B when flexed 100,000 times at 100° C. has cracked less than half as much as Compound A flexed 5,000 times, thus bearing out the previous tests.

The increased hot flexing resistance imparted to GR-S carcass stocks by the addition of clay is again demonstrated in Fig. 5. Here, Compound A contains 15 parts of channel black and 8 volumes of clay while B represents the same stock with the substitution of an equal amount of carbon black for the clay. It will be seen that Compound A is in a much better condition after 100,000 flexes at 100° C. than Compound B in only 7500 flexes at the same temperature.

The same results are confirmed in Fig. 6 in which Compound B contains 50 parts of channel black and C

TABLE I (See Figure 9)

	A	B	C	D	E
GR-S	100.	100.	100.	100.	100.
Sulfur	1.5	1.5	1.5	1.5	1.5
Channel Black (E.P)	40.	40.	40.	50.	45.
Stearic Acid	1.	1.	1.	1.	1.
Benzothiazyl disulfide	0.8	0.8	0.8	0.8	0.8
Litharge	1.2	1.2	1.2	1.2	1.2
Zinc oxide	5.	5.	5.	5.	5.
Bardol B	5.	5.	5.	5.	5.
Clay	—	15.	20.	—	10.
	Tensile—Lbs. Per Sq. In.				
Cure @ 287°F.					
20 mins.	1910	1650	1600	1890	—
30 mins.	2130	2220	2200	2620	—
45 mins.	2670	2480	2390	2750	—
60 mins.	2670	2780	2550	2970	2760
75 mins.	2840	2660	2530	3030	—
120 mins.	—	2960	—	—	—
	% Elongation				
20 mins	840	810	810	725	—
30 mins	675	735	725	650	—
45 mins	680	685	665	600	—
60 mins	635	700	640	580	625
75 mins	625	635	630	585	—
120 mins	—	600	—	—	—
	Modulus @ 300% Elongation				
20 mins.	325	345	335	475	—
30 mins	535	510	535	810	—
45 mins.	665	645	670	995	—
60 mins.	745	755	745	1100	835
75 mins.	790	800	760	1190	—
120 mins.	—	910	—	—	—

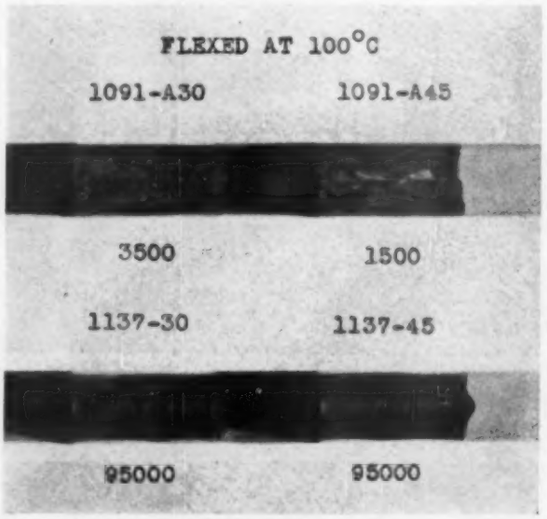


Fig. 3.

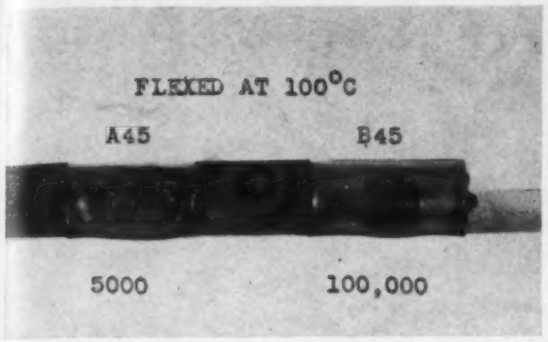


Fig. 4.

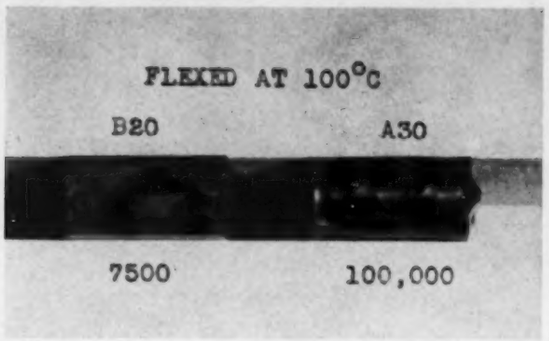


Fig. 5.

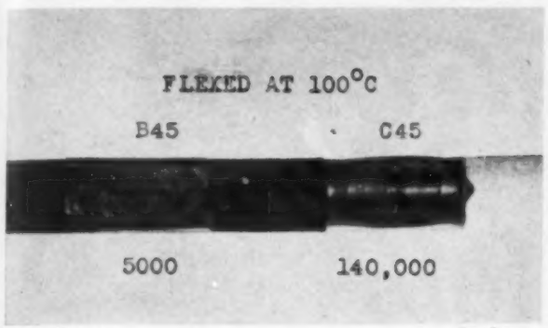


Fig. 6.

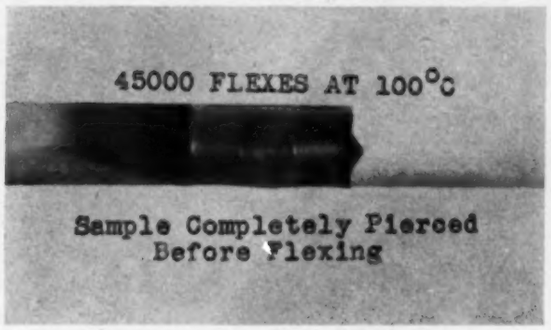


Fig. 7.

is the B stock plus 8 volumes of clay. Compound C has cracked far less in 140,000 flexes than B in only 5,000 flexes.

A slight variation in testing procedure was adopted in the case of Fig. 7, the sample used containing 50 parts of channel black and 8 volumes of clay. Instead of the customary pin hole about 1/16 in. deep, the test piece was completely pierced by a steel rod about ¼ in. in diameter. The hole shows practically no increase in size after 45,000 flexes at 100° C.

The effect of increasing concentrations of clay on the hot flexing properties of GR-S carcass stock is well demonstrated in Fig. 8. The compound used contained 15 parts of channel black and, respectively, 2, 4, 6 and 8 volumes of clay. It will be noted that the compound containing only 2 volumes of clay cracked almost entirely across in only 2,500 flexes at 100° C., while that containing 8 volumes of clay cracked only slightly at 100,000 flexes. A corresponding reduction in crack growth is very evident with increased loadings of clay.

Fig. 9 shows the results on five GR-S tread stock samples, each containing different amounts of carbon black and clay. Specific formulas used and some physical test results will be found in Table I. It will be noted from Fig. 9 that Compounds A and D have cracked almost entirely through in 5,000 flexes, while the cracks in Compounds B and C are only about one-half as wide and much less in depth after 100,000 flexes. It will also be seen that Compound E in 25,000 flexes is in better shape than Compounds A and D in 5,000 flexes. Special notice should be taken of the fact that Compound B when cured for 120 minutes cracked less severely in 60,000 flexes than Compounds A and D in 5,000 flexes at the 60 minute cure.

An indication that clay also imparts better flexing resistance to natural rubber treads is given in Fig. 10, in which Compound A represents a 100% smoked sheet tread stock containing 40 parts of carbon black (with no antioxidant) and Compound B the same stock plus 6 volumes of clay. It can be seen that when flexed at

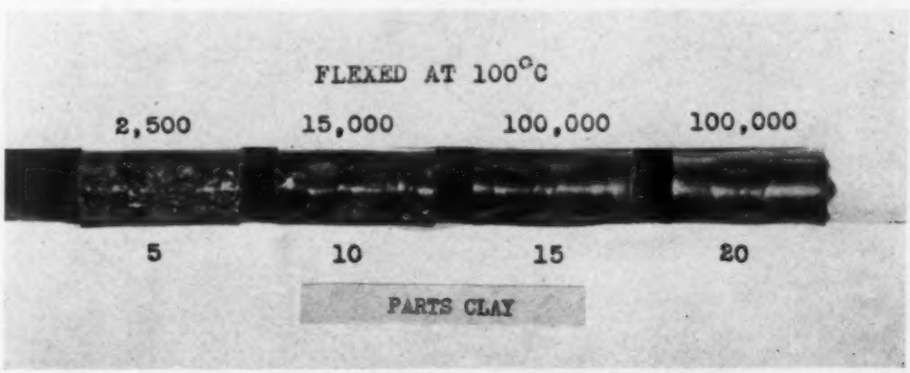


Fig. 8.

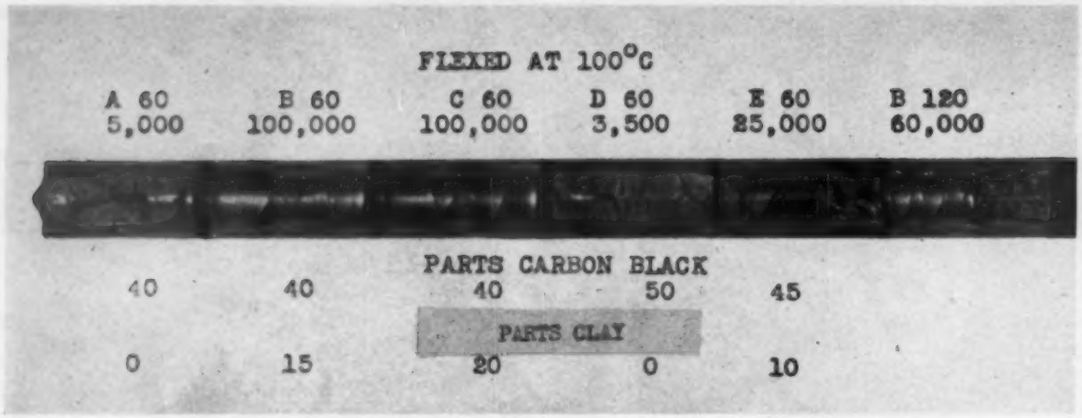


Fig. 9.

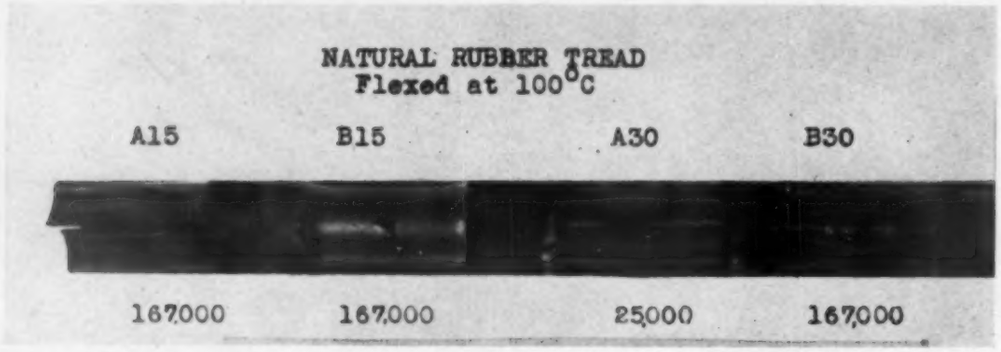


Fig. 10.

100° C. the 15 and 30 minute cures of Compound A have cracked much more severely than the corresponding cures of Compound B. In fact, Compound B at the 15 minute cure shows little cracking at 167,000 flexes.

The effect of clay on the hot flexing resistance of a natural rubber tread stock, with and without clay, and a GR-S tread stock with 15 parts of clay is illustrated in Fig. 11. Compound 1162-A is a 100% natural rubber tread stock containing 50 parts of channel black and antioxidant; 1162-B is the same stock, plus 6 volumes of clay; and 1158-B is a GR-S tread stock containing 40 parts of channel black and 6 volumes of clay. It will be noted that Compound 1162-B flexed much better than 1162-A at the 45 and 120 minute cures, and that the GR-S stock also flexed better than 1162-A at both cures. The best performance was given by 1162-B (the natural rubber stock with 15 parts of clay) at both the 45 and 120 minute cures, only slight cracking being evident at the 45 minute cure.

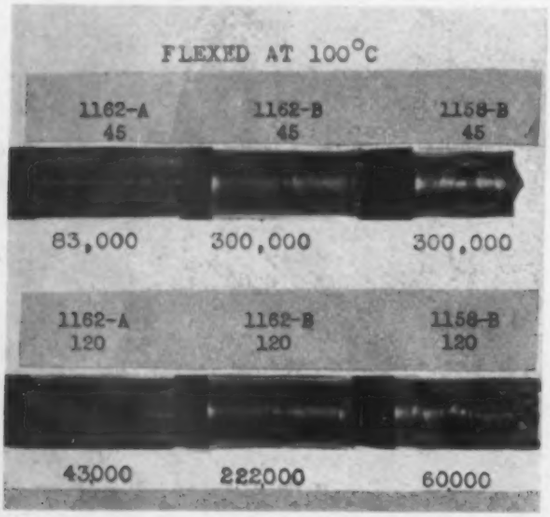


Fig. 11.

Judging from the appearance of the cracks, the manner in which they develop and the structure of the pigment itself it would appear that there is a definite orientation of the pigment which produces a laminated structure within the rubbers. An X-ray picture appears to confirm this supposition. The results aroused speculation regarding the practical value of this development and preliminary tests were made to determine their performance in tires.

A tire was fabricated with a composite tread; half being a normal GR-S tread compound containing 40 parts of channel black and the other half identical except for the addition of 10 parts of clay. The tire was punctured by a sharp instrument entirely through the tread and carcass in several places, and a run was made on the test wheel. After completion of the run an examination disclosed that several cracks proceeding from the punctures had developed in the normal tread stock but none in the special compound.

ACKNOWLEDGMENTS

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Effects of Petroleum Products on Synthetic Vulcanizates

By R. E. MORRIS[1], R. R. JAMES[2], E. B. CALDWELL[3], and T. A. WERKENTHIN[4]

OIL-RESISTANT synthetic rubbers are now being made by six companies. Each of these companies has prepared brochures describing their products, but no comparisons covering the field have been published. The purpose of this work was to compare all commercially available oil-resistant synthetic rubbers* from the standpoint of their gasoline and oil resistance.

The commercially available oil-resistant synthetic rubbers are classified as to chemical composition and manufacturer in Table I. Besides these domestic rubbers, one foreign rubber, German Perbunan, was included in this series of tests. German Perbunan is a copolymer of butadiene with acrylonitrile.

Stocks Tested

Vulcanizates were prepared from these synthetic rubbers using the recipes and curing times given in Table II. All of the recipes were made as similar as possible; in every recipe the content of raw synthetic rubber was within 49% to 54% of the total weight and 75 parts of semi-reinforcing black was the principal pigment loading. No softeners or plasticizers were used except the minimum amount of stearic acid required for accelerator activation or to prevent certain of the synthetic rubbers from sticking to the mill rolls during mixing.

The stocks used in these tests were compounded as simply as possible in order that their behavior in solvents could be reasonably regarded as a measure of the solvent resisting characteristics of the rubbers themselves. The compounding of the stocks was simplified by eliminating the plasticizers ordinarily employed in commercial practice and by using the same pigment loading in all stocks. A stricter parallelism between the stocks could have been obtained by employing recipes which all contained the same percentage of rubber by volume.

Petroleum Products Used

The resistances of the synthetic rubbers to petroleum products were found by immersing different specimens of each stock for two weeks in iso-octane, a gasoline-aromatic blend and turbine oil, all at 82° F., and in turbine oil at 190° F., then determining the changes which had occurred in volume, tensile strength and ultimate elongation. In addition, the rates of diffusion

Note: The opinions or assertions contained in this article are the private ones of the writers and are not to be construed as official or reflecting the views of the Navy Department or the Naval service at large.

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[5] Fraser, *Ind., Eng. Chem.*, 32, 320 (1940); 34, 1301 (1924); *Rub. Chem. & Tech.*, 14, 204 (1941).

[6] "A.S.T.M. Standards on Rubber Products," Designation: D471-40T.

[7] Garvey, *Rub. Chem. & Tech.*, 14, 741 (1941).

* Available at the time this work was commenced.

† The boiling point of pure 2,2,4-trimethyl pentane (pure iso-octane) is 211° F.

TABLE I—COMMERCIALLY AVAILABLE OIL-RESISTANT SYNTHETIC RUBBERS

Proprietary Name	*Chemical Composition* *	*Manufacturer*
Butaprene NM	Modified butadiene-acrylonitrile copolymer	Firestone
Butaprene NXM	Modified butadiene-acrylonitrile copolymer	Firestone
Butaprene NX	Modified butadiene-acrylonitrile copolymer	Firestone
Chemigum I	Modified diolefin copolymer	Goodyear
Chemigum X	Modified diolefin copolymer	Goodyear
Hycar OR-15	Modified butadiene copolymer	Goodrich
Hycar OR-25	Modified butadiene copolymer	Goodrich
Perbunan	Butadiene-acrylonitrile copolymer	Standard Oil
Thiokol RD	Diolefine copolymer (?)	Thiokol
Thiokol F	Organic polysulfide	Thiokol
Thiokol FA	Organic polysulfide	Thiokol
Neoprene E	Chloroprene polymer	DuPont
Neoprene FR	Chloroprene copolymer (?)	DuPont
Neoprene GN	Chloroprene polymer	DuPont
Neoprene ILS	Chloroprene copolymer (?)	DuPont

* The first nine rubbers in this tabulation are designated as Buna N types in the text for brevity.

TABLE II—RECIPES AND CURES FOR SYNTHETIC VULCANIZATES

	Buna N Types *	Thiokol F	Thiokol FA	Neoprene E	Neoprene FR	Neoprene GN	Neoprene ILS
Rubber	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Semi-reinforcing carbon black †	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Zinc Oxide	5.0	10.0	10.0	10.0	....	5.0	10.0
Light Calcined Magnesia	....	....	....	10.0	....	4.0	10.0
Litharge	....	....	....	....	10.0	....	....
Stearic Acid	1.0	0.5	0.5	0.5	1.0	0.5	0.5
Wood Rosin	....	....	....	5.0	....	....	....
Phenyl alpha Naphthylamine	1.0	....	....	2.0	2.0	2.0	2.0
Di-ortho-tolylguanidine Salt of Dicatechol Borate	....	....	....	....	....	....	1.0
Dibenzothiazyl Disulfide	1.75	0.35	0.3	....	....	....	....
Diphenyl Guanidine	....	0.1	0.1	....	....	....	....
Sulfur	1.75	....	....	1.0	1.0	....	....
Cure—Time, min.	60	50	40	40	40	40	40
Temperature, °F.	274	298	298	307	287	287	307

* Butaprene NM, Butaprene NXM, Butaprene NX, Chemigum I, Chemigum X, Hycar OR-15, Hycar OR-25, Perbunan (domestic and German), Thiokol RD. † Pelletex was used.

at 82° F. of iso-octane through sheets of the synthetic vulcanizates were determined.

The properties of the petroleum products used in these tests are given in Table III. It will be noted that these petroleum products cover a wide range in aniline point, gravity and viscosity. These characteristics have been connected with the deteriorating action of petroleum products on neoprene by Fraser *(5)*.

The iso-octane was obtained by fractionating the technical grade of 2,2,4-trimethyl pentane purchased from the Eastman Kodak Company, Chemical Sales Division. The fraction boiling between 210 and 215° F. was used.† The gasoline-aromatic blend contained 60 per cent 100-octane gasoline (leaded), 20 per cent c.p. toluol, 15 per cent c.p. xylol and 5 per cent c.p. benzol by volume. The turbine oil was a standard grade.

Immersion and Diffusion Tests

The immersion tests were made in accordance with the A.S.T.M. recommended procedures for change in volume and immediate deteriorated properties *(6)*. The specimens for the immersion tests were prepared from sheets, 0.08 inch thick, which had been vulcanized in an A.S.T.M. tensile sheet mold and then buffed on both sides with crocus cloth to remove the surface gloss. The specimens for determining change in volume were 1 inch x 2 inches. The specimens for determining change in tensile strength in ultimate elongation were A.S.T.M. Type C dumbbells. The tensile properties were determined immediately after the two-week immersion period. The tensile strength values were based on the respective cross sectional areas at the time of test.

The two-week immersion period was selected on the basis of preliminary tests for volume change using the Garvey method *(7)*. These tests showed that the volume change of all specimens had virtually stopped after 4 days in iso-octane, 6 days in the gasoline-aromatic blend, 14 days in turbine oil at 82° F. and 5 days in turbine oil at 190° F. It was recognized that Garvey test specimens reach equilibrium somewhat before A.S.T.M. test specimens because of their difference in shape—the Garvey specimens are 0.06 inch x 0.06 inch x 4 inches while the A.S.T.M. specimens are 0.08 inch x 1 inch x 2 inches. Nevertheless, the two-week period was believed to be long enough to obtain satisfactory comparative values with A.S.T.M. specimens.

In order to determine the rates of diffusion at 82° F. of iso-octane through the synthetic vulcanizates, sheets 0.03-0.05 inch thick were molded from each vulcanizate. The sheets were buffed with crocus cloth to remove the surface gloss. Discs were then cut from the sheets and fastened over the top of spun aluminum cups by means of aluminum clamping rings as shown in Fig. 1. The exposed area of rubber was exactly 20 square centimeters. The inside diameter and depth of the diffusion cup were 5.04 and 10 centimeters respectively.

TABLE III—PROPERTIES OF PETROLEUM PRODUCTS

	Aniline Point °F.	A.P.I. Gravity (at 60° F.)	Viscosity-Saybolt Universal (at 100° F.) sec.
Iso-octane	173.1	71.2	30
Gasoline-aromatic blend	61.3	50.4	30
Turbine oil	184.5	21.8	510

Calculation of Diffusion Losses

The diffusion cups were filled with 150 cubic centimeters of iso-octane, the rubber discs clamped into place, and the cups inverted and placed in a small horizontal wind tunnel. The head of iso-octane in each cup amounted to 7.5 centimeters. The air in the wind tunnel moved with a velocity of 565 feet per minute. The loss in weight of the cups due to diffusion of the iso-octane through the rubber into the air was measured at 24-hour intervals on an analytical balance. The diffusion losses were calculated in terms of milligrams per millimeter thickness per square centimeter area per 24 hours.

TABLE IV—EFFECT OF IMMERSION IN PETROLEUM PRODUCTS FOR TWO WEEKS

Vulcanizate	Initial Properties: Shore Hardness (10 sec.)	Initial Properties: Tensile Strength p.s.i.	Initial Properties: Ultimate Elongation %	Iso-octane at 82° F.: Tensile Strength p.s.i	Iso-octane at 82° F.: Change from Initial %	Iso-octane at 82° F.: Ultimate Elongation %	Iso-octane at 82° F.: Change from Initial %	Iso-octane at 82° F.: Volume Change %	Gasoline-Aromatic Blend at 82°F.: Tensile Strength p.s.i	Gasoline-Aromatic Blend at 82°F.: Change from Initial %	Gasoline-Aromatic Blend at 82°F.: Ultimate Elongation %	Gasoline-Aromatic Blend at 82°F.: Change from Initial %	Gasoline-Aromatic Blend at 82°F.: Volume Change %
Buna N Types													
Butaprene NM	71	2460	290	2360	— 4	250	—14	+ 1.6	1190	—52	180	—38	+ 34.1
Butaprene NXM	69	1910	220	1430	—25	170	—23	+ 9.4	710	—63	110	—50	+ 55.8
Butaprene NX	75	3000	200	2310	—23	170	—15	+ 0.6	1200	—60	130	—35	+ 36.7
Chemigum I	76	3010	210	2610	—13	200	— 5	+ 6.2	1050	—65	120	—43	+ 43.1
Chemigum X	84	3210	190	3100	— 3	160	—16	+ 1.3	1840	—43	150	—21	+ 23.5
Hycar OR-15	72	2790	370	2520	—10	240	—35	+ 1.0	1530	—45	200	—46	+ 29.5
Hycar OR-25	70	2960	310	2360	—20	250	—19	+ 3.8	1230	—58	170	—45	+ 41.8
Perbunan (Stanco)	70	2910	320	2170	—25	250	—22	+ 8.6	1220	—58	180	—44	+ 50.3
Perbunan (German)	75	3060	270	2270	—26	220	—19	+ 8.7	1210	—60	160	—41	+ 64.1
Thiokol RD	87	2520	170	2490	— 1	160	— 6	+ 0.1	1400	—44	150	—12	+ 31.2
Organic Polysulfides													
Thiokol F	82	1480	210	1380	— 7	170	—19	0	1050	—29	250	+19	+ 10.8
Thiokol FA	81	1480	200	1220	—18	140	—30	— 0.3	870	—41	190	— 5	+ 10.5
Chloroprene Polymers and Copolymers													
Neoprene E	82	2490	200	1940	—22	180	—10	+15.7	600	—76	120	—40	+102.2
Neoprene FR	73	2210	180	1540	—30	150	—17	+26.6	760	—66	90	—50	+111.1
Neoprene GN	81	2870	260	2200	—23	230	—12	+17.1	910	—68	170	—35	+ 97.1
Neoprene ILS	86	2570	150	2360	— 8	140	— 7	+ 1.9	1030	—60	80	—47	+ 39.2
				Turbine Oil at 82° F.					Turbine Oil at 190° F.				
Buna N Types													
Butaprene NM	71	2460	290	2410	— 2	270	— 7	+ 1.5	2520	+ 2	200	—31	+ 3.7
Butaprene NXM	69	1910	220	1790	— 6	210	— 5	+ 4.1	1670	—13	160	—27	+ 14.1
Butaprene NX	75	3000	200	2420	—19	170	—15	+ 3.9	2460	—18	140	—30	+ 3.2
Chemigum I	76	3010	210	2840	— 6	210	0	— 0.5	2740	— 9	150	—29	+ 5.4
Chemigum X	84	3210	190	3040	— 5	170	—11	— 3.8	3520	+10	150	—21	— 1.1
Hycar OR-15	72	2790	370	2500	—10	240	—35	— 0.3	3050	+ 9	180	—51	+ 1.5
Hycar OR-25	70	2960	310	2520	—15	260	—16	+ 5.1	2720	— 8	190	—39	+ 5.4
Perbunan (Stanco)	70	2910	320	2500	—14	280	—13	+ 1.5	2500	—14	220	—31	+ 8.8
Perbunan (German)	75	3060	270	2550	—17	250	— 7	+ 2.1	2350	—23	190	—30	+ 10.8
Thiokol RD	87	2520	170	2360	— 6	170	0	+ 9.9	3030	+20	130	—24	+ 1.3
Organic Polysulfides													
Thiokol F	82	1480	210	1450	— 2	210	0	+ 0.8	1340	— 9	120	—43	+ 6.0
Thiokol FA	81	1480	200	1300	—12	180	—10	+ 1.1	1090	—26	80	—60	— 4.5
Chloroprene Polymers and Copolymers													
Neoprene E	82	2490	200	2260	— 9	200	0	+ 8.1	1520	—39	170	—15	+ 51.4
Neoprene FR	73	2210	180	1780	—19	160	—11	+11.9	1080	—51	130	—28	+ 87.3
Neoprene GN	81	2870	260	2510	—13	300	+15	+20.8	1720	—40	320	+23	+ 55.3
Neoprene ILS	86	2570	150	2640	+ 3	150	0	+ 1.7	2770	+ 8	130	—13	+ 5.8

Test Results

The results of the immersion tests are given in Table IV. These data show that the petroleum products in most cases decreased the tensile properties and increased the volume of the synthetic vulcanizates. The extent of these changes depended upon the characteristics of the petroleum products and the temperature. In general they were greatest in the gasoline aromatic blend and least in the turbine oil at 82° F. The effects in iso-octane and turbine oil at 190° F. were intermediate.

By analyzing these data in connection with the properties of the petroleum products given in Table III it will be noted that the liquid with the lower aniline point (gasoline-aromatic blend) is the more severe when two liquids having the same viscosity (gasoline-aromatic blend and iso-octane) are compared, and the liquid with the lower viscosity (iso-octane) is the more severe when two liquids having almost the same aniline point (iso-octane and turbine oil) are compared. These observations substantiate Fraser's conclusions from his work with neoprene.

A few of the vulcanizates, however, did not follow the usual trend. For example, the tensile strengths of the Chemigum X, Hycar OR-15, Thiokol RD and Neoprene ILS vulcanizates increased in the turbine oil at 190° F; likewise the ultimate elongation of the Thiokol F vulcanizate increased in the gasoline aromatic blend and the ultimate elongation of the Neoprene GN vulcanizate increased in the turbine oil at 82° F. and at 190° F. Anomalies also occurred in the volume changes: the Thiokol FA vulcanizate sustained a moderate loss of volume in turbine oil at 190° F. and the Chemigum X vulcanizate was similarly affected in turbine oil at 82° and 190° F. These decreases in

TABLE V—DIFFUSION OF ISO-OCTANE THROUGH SYNTHETIC VULCANIZATES

	mg./mm. thickness/sq. cm. area/24 hours
Buna N Types	
Butaprene NM	0.0
Butaprene NXM	4.4
Butaprene NX	0.0
Chemigum I	1.2
Chemigum X	0.0
Hycar OR-15	0.0
Hycar OR-25	0.9
Perbunan (Stanco)	2.6
Perbunan (German)	3.7
Thiokol RD	0.0
Organic Polysulfides	
Thiokol F	0.1
Thiokol FA	0.2
Chloroprene Polymers and Copolymers	
Neoprene E	16.3
Neoprene FR	54.3
Neoprene GN	17.1
Neoprene ILS	0.2

volume indicated the extraction of oil-soluble ingredients from the rubbers.

It was noticed that the Thiokol FA vulcanizate softened on the surface to such an extent during immersion in hot turbine oil that the rubber could be rubbed off with the fingers. This deterioration of the surface was not observed on the other synthetic vulcanizates after immersion in hot oil.

The data given in Table IV are summarized below to assist the reader in comparing the various vulcanizates. The order of listing the rubbers under the ratings is not significant.

1. Initial Properties

a. Hardness		b. Tensile Properties	
Highest	Thiokol RD	*Best*	Hycar OR-15
	Neoprene ILS		Hycar OR-25
Lowest	Butaprene NM		Perbunan (Stanco)
	Butaprene NXM	*Poorest*	Thiokol F
	Hycar OR-15		Thiokol FA
	Hycar OR-25		
	Perbunan (Stanco)		
	Neoprene FR		

2. Properties after Immersion in Iso-octane for Two Weeks at 82° F.

a. Tensile Properties		b. Volume Change	
Best	Butaprene NM	*Least*	Butaprene NM
	Hycar OR-15		Butaprene NX
	Hycar OR-25		Chemigum X
	Perbunan (Stanco)		Hycar OR-15
Poorest	Butaprene NXM		Thiokol RD
	Thiokol F		Thiokol F
	Thiokol FA		Thiokol FA
	Neoprene FR		Neoprene ILS
		Greatest	Neoprene E
			Neoprene FR
			Neoprene GN

3. Properties after Immersion in Gasoline-Aromatic Blend for Two Weeks at 82° F.

a. Tensile Properties		b. Volume Change	
Best	Chemigum X	*Least*	Thiokol F
	Hycar OR-15		Thiokol FA
	Thiokol F	*Greatest*	Neoprene E
Poorest	Butaprene NXM		Neoprene FR
	Neoprene E		Neoprene GN
	Neoprene FR		
	Neoprene ILS		

4. Properties after Immersion in Turbine Oil for Two Weeks at 82° F.

a. Tensile Properties		b. Volume Change	
Best	Perbunan (Stanco)	*Least*	Butaprene NM
	Neoprene GN		Chemigum I
Poorest	Thiokol F		Hycar OR-15
	Thiokol FA		Perbunan (Stanco)
	Neoprene FR		Thiokol F
			Thiokol FA
			Neoprene ILS
		Greatest	Neoprene GN

5. Properties after Immersion in Turbine Oil for Two Weeks at 190° F.

a. Tensile Properties		b. Volume Change	
Best	Butaprene NM	*Least*	Chemigum X
	Chemigum X		Hycar OR-15
	Hycar OR-15		Thiokol RD
	Hycar OR-25	*Greatest*	Neoprene E
	Perbunan (Stanco)		Neoprene FR
	Neoprene GN		Neoprene GN
Poorest	Thiokol F		
	Thiokol FA		
	Neoprene FR		

The results of the iso-octane diffusion tests are tabulated in Table V. These values are the modal averages over a ten-day period. The vulcanizates prepared from Butaprene NM, Butaprene NX, Chemigum X, Hycar OR-15 and Thiokol RD showed the greatest resistance to diffusion of iso-octane. The vulcanizates prepared from Neoprene E, Neoprene FR and Neoprene GN showed the least resistance to diffusion of iso-octane.

Official U. S. Navy Photograph.

Fig. 1—Diffusion Cup.

The results of the immersion and diffusion tests indicate that none of the synthetic vulcanizates could be considered as having the best resistance to all three petroleum products, although the Buna N type vulcanizates, particularly the Hycar OR-15 vulcanizate, exhibited outstanding resistance in most of the tests. The German Perbunan vulcanizate possessed about the same resistance to the petroleum products as Stanco Perbunan.

Effect of Plasticizers

It has been pointed out that the stocks tested did not contain plasticizers. Plasticizers in the form of resins, waxes, esters, coal tar oils, petroleum oils or vegetable oils are generally compounded with all of these rubbers except Thiokol F and Thiokol FA in order to obtain one or more of the following qualities: satisfactory processing, increased ultimate elongation, better resilience, less permanent set, less compression set and adequate cold resistance. Unfortunately, many of these plasticizers have a harmful effect on the resistance of the vulcanizates to petroleum products.

Since the type and amount of plasticizer which must be compounded with one synthetic rubber in order to obtain the desired performance characteristics will not necessarily be the same as for another synthetic rubber, the relative resistances of the respective vulcanizates will be changed, and may be reversed. Care must be used, therefore, in applying the information contained in this report to practical problems.

ACKNOWLEDGMENT

The authors wish to express their appreciation for the assistance given by Miss Dores E. Prien in this work.

Some Comments on the Article on "Solution Reclaim" which Appeared in the February, 1943, issue of "Rubber Age"

(A Letter to the Editor)

To the Editor:

In the article on "Solution Reclaim" which appeared in the February, 1943, issue of RUBBER AGE, the author, Dr. Hugo Fuchs, intimates that the discovery of reclaiming rubber by a solution method must be credited to Germany. This conclusion is apparently based on the fact that a search of the literature failed to uncover any articles in the trade or technical journals, or in books, indicating that discoveries or improvements were developed in countries other than Germany.

Mentioned in Patent Literature

It should be pointed out, however, that the discovery of solution reclaim has been described in both British and American patent literature. One of the primary reasons these discoveries have not been much publicized in the trade and technical journals in either England or the United States must be due to the fact that in these English-speaking countries there has been a preference of methods in which mineral fillers, carbon black, etc., are retained in the reclaim, but the fibres are either destroyed or converted into cellulose derivative, whereby the type of reclaim produced may be used as "distender" or "cheapener" in crude rubber compounding.

A brief search through the patent literature of the United States indicates that this country has developed (at least on paper) various methods of solution reclaim, some of which are improvements over those described in Dr. Fuchs' article. It is not known, however, whether any of these patents have ever been developed commercially in the United States. In fact, inquiries addressed to the leading rubber manufacturers in the United States have failed to reveal that the solution-dispersion methods developed by the Alexanders, as incorporated in British Patent Nos. 14,681 (1905) and 25,735 (1906), which correspond to U. S. Patent Nos. 821,394 and 844,077 and to German Patent Nos. 197,-154 and 200,667, were ever used in any of those countries.

The most widely used methods of reclaiming adopted in this country are the alkali method, the "heater" method, and the "peptizer" method, the last of which seems to be important and was developed in the United States. "The "dispersion" method, which may be called a variation and improvement of the methods of the Alexanders, is to a certain extent employed in this country for the production of artificial aqueous dispersions of rubber.

The patent literature reveals that at least 11 methods of producing reclaimed rubber by solution processes have been patented. Abstracts of these patents follow:

Waste vulcanized rubber is saturated with a solvent having a boiling point lower than the melting point of rubber, *e.g.*, gasoline, benzine, naphtha, etc., placed in a perforated basket, and subjected to the vapors of the same solvent at sufficiently high temperatures to vaporize the solvent in the rubber. Tubes or bicycle tires, as a whole, are soaked with gasoline and placed in the basket in a vaporizing chamber provided with a steam jacket, the bottom of the basket being set above the level of the gasoline in the vaporizing chamber. Heat is then applied so that the vaporizing chamber is at about 300°C., whereby the basket is enveloped by a curtain of solvent vapors and the solvent in the rubber is completely vaporized. By release of pressure, the vapors are removed, leaving the rubber in new condition. (Clark—U. S. Pat. 601,091—1898).

Methods for reclaiming rubber by treatment with aniline, toluidine, xylidene, etc., in the presence or absence of ethyl or amyl alcohol, which dissolves the solvent of the rubber, thereby precipitating the waste reclaimed rubber. Acid treatment, hydrochloric acid, may be combined. (Heingerling, U. S. Pat. 627,689, June 27, 1899). Note: This is a typical German disclosure, disclosing nothing but claiming all.

Vulcanized rubber waste is treated with a solvent which dissolves sulfur in the rubber, but not the rubber, at the temperature of the process. The waste rubber is immersed in naphtha, spirits of turpentine, etc., and heated at a temperature below 120°F., whereby the rubber is desulfurized without being dissolved. (Heyl Dia, U. S. Pat. 689,616, Dec. 4, 1901).

Waste rubber is disintegrated and digested with 4 to 8 parts of eucalyptol at 120° to 140°C. until the rubber is completely dissolved. The solution is diluted with 3 to 4 volumes of benzene, and any fillers, etc., which are undissolved, allowed to settle and removed by filtration. The solvent is distilled off and residue steam distilled with 3 to 4 volumes of steam to remove the eucalyptol. (Passmore. U. S. Pat. 924,101, Jan. 8, 1909; Br. Pat. 69,681—1898).

Additional Patent Abstracts

Waste rubber is dissolved in xylene, benzene, etc., to form a 20% solution which is heated at 130° to 150°C. for 10 hours in a closed vessel to form a solution which is mixed with 50% of water, calculated on the weight of the rubber, and heated at 130°C. for 5 hours to distill off the solvent. (Korner, U. S. Pat. 953,094, March 29, 1910; Br. Pat. 22,504—1910).

Waste vulcanized fibre scrap is treated with cuprammonium to convert the cellulose in the scrap into a cellulose derivative, thereby producing a plastic mass of reclaimed rubber containing the cellulose derivative in plastic, undissolved form. This reclaimed rubber is subjected to steam and washed with water. It can be compounded with crude rubber. (Wheeler, U. S. Pat. 1,049,955, Jan. 7, 1913).

Rubberized fabric from tires, which has been freed

(Continued on page 368)

Editorials

Central Laboratory

FROM time to time we have mentioned in these columns the desirability of a central fundamental research laboratory, supported by the rubber industry, with its results to be the property of the industry at large or at least that portion of it contributing to its operation. Unlike the function of a commercial laboratory, or one maintained in connection with the successful operation of a large industrial organization, that of the proposed laboratory would be confined solely to problems of fundamentals or, to put it colloquially, to determine what makes rubber tick. For example, what *is* vulcanization?

Some excellent opinions concerning the necessity for a laboratory of this type, indicative of long-term thinking, plus some hard hitting facts concerning its support, were contained in an address delivered by Dr. Norman A. Shepard, Chemical Director of the American Cyanamid Co., and technical consultant to the Office of the Rubber Director, at one of the four symposiums which featured the dedication of the new Goodyear Research Laboratory at Akron last month. Dr. Shepard spoke during the symposium on "Synthetic Rubber" and discussed "Synthetic Rubber Applications."

Expressing the hope that the research program maintained under the auspices of the Office of the Rubber Director will be continued after the unconditional surrender of the Axis powers, Dr. Shepard urged that such continuation be conducted in what he termed a "Rubber Institute." This Institute, he said, should preferably be supported by the entire industry, but if not by all then at least by the larger companies and those smaller companies which have managements with the vision to join in the effort. It should be ably headed and directed, with adequate laboratory facilities and personnel and an ample budget "enabling it to let out contracts to industrial laboratories, universities, and private institutions where these have personnel and facilities better suited for attacking a problem."

Too often the research chemist is accused of being an "idealist" with little respect for economics. But Dr. Shepard belies this belief. He has a suggestion which merits considerable thought. Funds for the "Rubber Institute" could be provided, in his opinion, by the participating companies, the assessment being pro-rated on the basis of pounds of rubber processed by each. If all rubber companies participated, a tax of 1/5th of a cent per pound of rubber consumed would bring in a fund of over $3,000,000 a year, based on a consumption rate of 700,000 tons per year. This is practical thinking.

We fully agree with Dr. Shepard that the rubber industry right now has an opportunity which is not likely to present itself again in the near future. The government program now in force has been carefully organized and is being well executed. It was designed by the top technologists in the industry. This program can be taken over and perpetuated for the benefit of the industry as a whole. It should be done, before the opportunity is lost, and plans for doing it should be made now to be put into effect just as soon as possible after the hour of victory strikes!

The R-1 Order

ALTHOUGH at first glance the new rubber order—R-1—which consolidates the M-15-b orders, amendments and related orders, appears to be voluminous, study of the order will soon convince every rubber manufacturer that it is actually a simplified order, since it is far more understandable from the standpoint of the manufacturer than was the original M-15-b order or any of the subsequent regulations. The lists of permitted and non-permitted items have been clarified and it is now easy to ascertain what may or may not be produced or which kind of rubber can or can not be used for military or civilian purposes. It should be pointed out that the new order gives WPB (through the Office of the Rubber Director) the right to "order the substitution of any type of synthetic rubber in place of crude rubber or latex . . . to fill any order . . . whether a government order or a civilian order." This, in other words, is indicative of conversion by necessity.

CURRENT NEWS OF THE MONTH

RUBBER ORDER R-1 IS ISSUED BY ORD SUPERSEDING ALL PREVIOUS REGULATIONS

ON JUNE 18 the Office of the Rubber Director issued the long-awaited and long-anticipated Rubber Order R-1, which supersedes and clarifies all of the nine previously issued orders affecting the manufacture of rubber products. The new order, which went into effect on July 1, relaxes certain of the restrictions on the allocation and use of synthetic rubber and at the same time tightens control over the dwindling stock-pile of crude rubber. The superseded supplementary orders are: M-13, M-15-b, M-15-b-1, M-15-d, M-15-e, M-15-f, M-15-g, M-15-h, and General Preference Order M-46. All of these orders were officially revoked on June 25.

Basically this new order will control the following operations within the rubber industry and is designed to accomplish these results:

Controlled Operations

1. It relaxes restrictions on certain types of synthetic rubber, namely, Buna S, Butyl and Neoprene. These synthetics are referred to in the Order as general purpose synthetics for the reason that they are suitable for substitution in the place of crude rubber. Under existing orders no synthetic rubber could be consumed except upon specific authorization. Under Rubber Order R-1, general purpose synthetics are administered in the same manner as crude rubber and latex under existing orders. The distribution of the remaining types of synthetic rubber (referred to as special purpose synthetics) is handled in the same manner as the distribution of all synthetic rubber under existing orders.

2. The manufacturers' allocation of rubber and general purpose synthetics can be used for the manufacture of a wider variety of civilian products than heretofore. Under M-15-b, the manufacturers' over-all quota of raw material was broken down into separate allocations for various groups of products appearing on the permitted lists. Under R-1 many of these groups have been thrown into larger groups, thus permitting the manufacturer to use his allocation of rubber and general purpose synthetics for the manufacture of a wider selection of goods.

3. Under Order R-1, the use of synthetic rubber for experimental purposes has been encouraged by a provision which obviates the necessity of obtaining authorization for such use.

4. The complex system of product schedules in M-15-b, and the list of manufacturing regulations in M-15-b-1, have been considerably revised and simplified. Many products which previously have been permitted on appeal, in exceptional circumstances, have now been added to the list of permitted products. Manufacturing regulations (compounding formulas) have had to be changed to reflect the increasing production and subsequent processing of synthetic rubber.

Definitions Are Revised

5. The definitions have likewise been revised. New definitions have been added, including, particularly, definitions of synthetic rubber, general purpose synthetics and special purpose synthetics. The definition of scrap rubber product has been enlarged, opening up for public use tires which may be made serviceable by insertion of reliners or the affixing of temporary patches. These tires were formerly classed as scrap rubber and as such could not be sold to the public.

6. The restrictions in orders M-15-d (distribution of airplane tires and tubes), and M-15-g (distribution of industrial power truck tires and tubes) have been done away with entirely. It is expected that the tire and tube inventory restrictions which have been added to Rubber Order R-1 will sufficiently curtail the acquisition of these products so that PD forms will be unnecessary. While inventory restrictions have been retained on stocks of raw material, new restrictions have been imposed upon tire and tube inventories of manufacturers, dealers, original equipment manufacturers and industrial consumers of replacement tires and tubes.

7. End product restrictions on the use of cement and the sale and acquisition of life-saving suits and gloves (formerly contained in orders M-15-f, M-15-e and M-15-h, respectively) have been carried over in Rubber Order R1, in more simplified form.

Reasons for the issuance of R-1, as described by the Office of Rubber Director, are as follows:

Because of the dwindling stockpile of crude rubber, it will be necessary to maintain an even tighter control over this material. This control is primarily exercised by reduced allocations and restrictions on the rubber content of goods manufactured.

At the present time, as the percentage of crude rubber allocated is being reduced, the percentage of general purpose synthetics allocated is being increased. The point has not yet been reached, however, when we can dispense with controls over synthetics.

It is contemplated that as soon as synthetic rubber is available in sufficient quantities, controls over synthetics will be relaxed as rapidly as possible. This can be accomplished by increased allocation, opening up of the regulations relating to the compounding of synthetic rubber. However, as the stockpile of crude rubber diminishes, even tighter control of this raw material will be necessary.

First Amendment Issued

The first amendment to the new R-1 order was issued on July 9. As originally written the order included in its inventory restrictions only industrial type tires and tubes. These restrictions, limiting manufacturers of new equipment to a 30-day inventory of tires and tubes, are extended by the amendment to apply to manufacturers of new vehicles in the following groups: Passenger and motorcycle tires and tubes; truck, bus and special purpose tires and tubes; farm tractor implement tires and tubes; bicycle tires and tubes, and airplane tires and tubes.

In addition, the amendment adds molded wheels and casters of all types to the list of rubber products permitted for civilian manufacture (Schedule A), and removes the restriction on the use of rubber for the manufacture of molded casters for government orders (Schedule B).

Set New Price on GR-M

In Circular No. 22, dated July 6, the Rubber Reserve Co. announced that it will henceforth sell GR-M (Neoprene) at a price of 27½c per pound for "Civilian Use," plus, of course, uniform freight charges. This is the first time a price has been set on GR-M for such use. Although no change was made in the price of 45c per pound on GR-M for

"Other than Civilian Use," in view of the problems involved in the adjustment of "war orders" to reflect such price, the special procedure previously outlined (in paragraph 3 of Circular No. 21) shall apply to the payment of such price with respect to sales of GR-M for use in the manufacture of end-products covered by "war orders."

In other words, effective with purchase permits issued on and after July 10, Rubber Reserve will accept payment from manufacturers of 27½c per pound for all sales of GR-M whether for "Civilian Use" or "Other than Civilian Use." With respect to GR-M used after July 31 for "war orders," the War Department, Navy Department, Procurement Division of the Treasury Department, and the U. S. Maritime Commission will make payments direct to Rubber Reserve in the amount of 17½c per pound.

Manufacturers which have purchased on or after July 1 GR-M at 45c per pound, should send a debit memorandum to Rubber Reserve in an amount equal to the difference between the price actually paid on the basis of 45c per pound and the new price of 27½c per pound. All such debit memoranda must schedule by purchase permit number the deliveries and amounts of the purchases in connection with which such refund is requested. Checks will be sent to the manufacturer by Rubber Reserve if the amounts are found to be correct.

Circular No. 22 also makes it clear that in cases where manufacturers, for experimental purpose, desire to purchase general purchase synthetic latices in quantities not in excess of 10 gallons, and/or any general purpose synthetic rubber in quantities not in excess of 100 pounds, requests therefore should be sent direct to Rubber Reserve rather than to the Office of the Rubber Director. This relates only to synthetic latices and general purpose synthetic rubber produced in government-owned plants. Neoprene has been established as a general purpose synthetic.

OPA SETS UNIFORM PROVISION FOR PRICING; OTHER OFFICIAL ORDERS

A uniform provision for adjustable pricing was placed by OPA on June 26 in eight maximum price regulations which affect various types of rubber commodities. At the same time, it revoked a provision for adjustable pricing in Supplementary Regulation No. 14, through Amendment 190, effective July 2. The latter provision was written in because increased cost of crude rubber led to the anticipation of higher ceilings on sales of rubber products to Government agencies. However, the agencies have made arrangements to meet the increased costs of the rubber by means which will not affect ceiling prices, so the provision was no longer necessary.

The provision incorporated in the eight other regulations gives any person the privilege of selling at a price which can be increased up to the maximum price in effect at the time of delivery. But it prohibits anyone from delivering or agreeing to deliver at prices to be adjusted upward in accordance with action taken by OPA after delivery, unless he is authorized by OPA to do so.

Authority to sell at prices to be adjusted upward in accordance with action taken by OPA after delivery may be granted, OPA said, but "only if the authorization is necessary to promote distribution or production, and if it will not interfere with the purposes of the Emergency Price Control Act of 1942, as amended." In such cases it will be issued in an order by the Price Administrator, or an OPA official to whom the authority is delegated.

The adjustable pricing provision was incorporated in the following regulations by the amendments indicated, all of which were effective on July 2: Amendment 3 to MPR 131 (Camelback), Amendment 3 to RPS 56 (Reclaimed Rubber), Amendment 6 to MPR 143 (Tires and Tubes), Amendment 6 to RPS 87 (Scrap Rubber), Amendment 11 to MPR 107 (Used Tires and Tubes), Amendment 4 to RPS 66 (Retreaded and Recapped Tires), Amendment 6 to MPR 229 (Victory Line Rubber Footwear), Amendment 8 to MPR 200 (Rubber Heels).

DRUG SUNDRIES

Dollars-and-cents ceilings that may be charged by manufacturers, wholesalers and retailers for fountain syringes were established on July 2 by OPA through the issuance of Amendment No. 9 to MPR 300 (Maximum Manufacturers' Prices for Rubber Drug Sundries) and Amendment No. 7 to MPR 301 (Retail and Wholesale Prices for Rubber Drug Sundries). Both amendments were effective July 9.

The ceilings provided by the amendments apply to fountain syringes of reclaimed rubber which the industry recently has been permitted to produce under specifications established by WPB. The specifications are adopted by OPA.

No ceilings for newly manufactured fountain syringes were given previously as rubber fountain syringes were not being made. Carry-over stocks made from crude rubber have been sold by their manufacturers under maximum prices established by the General Maximum Price Regulation.

The ceilings for newly-made fountain syringes are in line with maximum prices of other rubber drug sundries, being substantially the same as prices for similar products on December 1, 1941. At the manufacturers' level they are two cents higher than the prices at which hot water bottles bearing the same brand are sold. This relationship is in harmony with industry pricing practice, and was adopted after extensive consultation with industry members.

Both amendments define more clearly what type of adjustable pricing is permitted, in language which is uniform with that of adjustable pricing provisions in other regulations. Thus, they state, "Any person may agree to sell at a price which can be increased up to the maximum price in effect at the time of delivery; but no person may, unless authorized by the Office of Price Administration, deliver or agree to deliver at prices to be adjusted upward in accordance with action taken by the Office of Price Administration after delivery."

Earlier, on June 24, OPA issued Amendment No. 8 to MPR 300, which stated that paragraph (d) of Section 1315.1755a is applicable to any rubber drug sundry listed in paragraph (h) of Appendix A which is the same as a rubber drug sundry offered for sale by the distributor on January 1, 1941, and that "notwithstanding any other provisions of this section, if the price the distributor had in effect on January 1, 1941, for such rubber drug sundry was higher than the price determined in accordance with the preceding provisions of this section, the maximum price for that sundry shall be the price the distributor had in effect to a purchaser of the same class on January 1, 1941." The amendment was effective June 30.

SCRAP RUBBER

New ceiling prices for scrap rubber consisting of tires or made from tires have been established by OPA. The new prices, which became effective on July 1, are generally $2.00 per ton higher than those previously in effect, thus resulting in a reduction in the amount of subsidy the government pays to maintain low prices for scrap. The reduction in cost to the government, based on the new ceilings, is estimated to be approximately between $750,000 and $1,000,000 annually. There will be no effect upon consumer prices of finished rubber products made of reclaim, since the reclaimers will absorb the increase.

In issuing the new ceilings, covered by Amendment 7 to RPS 87 (Scrap Rubber), OPA pointed out that sales of scrap rubber to industrial consumers are made by Rubber Reserve Co. exclusively and that reclaimers have been buying the scrap from Rubber Reserve at agreed-upon prices which have been considerably below permitted ceilings. The difference in cost between the purchase of scrap by Rubber Reserve and its sale to reclaimers has been absorbed by the government. The agreement between the reclaimers and Rubber Reserve expired on July 1 and was replaced by the prices provided in the new amendment.

The increase is generally $2.00 per short ton above previous prices for tire items and 10% above the agreed-upon previous prices for parts of tires. As in previous orders, the specific ceiling

prices are set for different items at the chief consuming centers: Akron, Buffalo, Naugatuck, East St. Louis, Memphis, Gadsden and Los Angeles. Prices at other consuming centers are lower in the main than those at Akron.

MECHANICAL GOODS

Following a meeting in New York City with the recently - organized Mechanical Rubber Goods Industry Advisory Committee, of which W. S. Richardson, of the B. F. Goodrich Co., is chairman, OPA officials announced on June 16 that the effective date of Amendment 9 to MPR 149 (Mechanical Rubber Goods) was postponed to July 10. This amendment established a formula by which maximum prices of mechanical rubber goods containing synthetic rubber bought at lowered prices could be established. The postponement was officially permitted by Amendment 11 to MPR 149.

Originally, Amendment 9 containing the formula for adjusting prices was to become effective on June 17. The 23-day postponement was provided so that in accordance with the suggestions from the industry the development of specific dollars-and-cents ceilings might be considered. The action affected chiefly rubber hose, sheet packing and other items made of neoprene.

RUBBER FOOTWEAR

Two amendments have been issued by OPA to the new Ration Order 6A (Men's Rubber Boots and Shoes) which last month superseded RO 6. Amendment 1, issued July 8 and effective July 14, authorizes the Office of Civilian Defense to get ration certificates for men's rubber boots for distribution to people who need them in performing essential services sponsored by OCD. Previously, OCD was not eligible for such certificates.

Amendment No. 2, also issued on July 8 and effective July 14, clarifies the procedure for refunding ration certificates to customers who return unused rubber boots or work shoes to retailers. It specifies that, in full refund transactions, the retailer must return the customer's original ration certificate if he still has it on hand. No endorsement is required. If the certificate which was surrendered at the time of purchase is not on hand, the dealer may give the customer any available certificate valid for the same type and quantity of rubber footwear returned.

RUBBER CEMENT

Harold Connett, chief of the Leather and Shoe Branch of WPB, has pointed out in a letter to shoe manufacturers that under the new R-1 order, shoe manufacturers are permitted to use rubber cement for additional operations, including joining materials to make an insole, joining materials to make an outsole, wood heel covering and platform binding, and cementing heel pads, sock-linings, inner shoe cushions, and inner shoe pads.

Mr. Connett made it clear that this action does not mean that a greater quantity of rubber cement will be available, but that the purpose of the order is to give shoe manufacturers a wider choice of operations where such cement may be used to best advantage in the quantities available. He urged that every effort be made to conserve rubber cement by attempting to obtain and use substitutes wherever possible.

MISCELLANEOUS ORDERS

Methods for determining the maximum prices at which manufacturers may sell 19 main classes of resins and plastics materials are provided in MPR 406, issued by OPA on June 16. Phenolic resins, cellulose esters and ethers, alkyd resins, and acrylate resins are covered.

OPA has revoked the amendment to General Limitation Order L-165, issued on May 19, prohibiting the manufacture of armored cable as defined, and the original order, which was effective September 30, 1942, is again in force without interruption. Under the terms of the September order, the manufacture of armored cable used as a conductor of electricity in interior wiring systems is prohibited. This type is commonly known as "BX" cable.

Glycol ethers have been placed under allocation control by WPB through the issuance of Allocation Order M-336. The order provides that on and after July 1 no supplier may deliver glycol ethers to any person except as specifically authorized or directed in writing by WPB.

The current market price of 9 cents per pound for ethylene glycol, lowest in the history of the industry, has been established by OPA as the maximum price of producers' sales. The new ceiling was established by individual agreements with each of the three producers of this material—Carbide & Carbon, Dow and DuPont.

RUBBER HEELS

"Verticord" heels, made by the O'Sullivan Rubber Co., has been added to the list of rubber heels covered in MPR 200 (Rubber Heels). The addition was covered in Amendment No. 9, issued July 1 and effective July 8.

Under the terms of an amendment to Limitation Order L-239, no box for packing rubber heels may now be designed to contain less than six pairs of heels. Such boxes may not be made of paperboard thicker than .024 caliper, or of paperboard better in quality than bleached manila-lined news.

OFFICIALS INSPECT COMPLETE SYNTHETIC RUBBER UNIT AT INSTITUTE, W. VA.

In the above reproduction, left to right, Jesse H. Jones, Secretary of Commerce and nominal head of the Defense Plant Corporation, F. B. Davis, Jr., chairman of the U. S. Rubber Co., and William M. Jeffers, Rubber Director, are seen examining one of the bales of synthetic rubber now produced at the co-polymer plant operated by U. S. Rubber at Institute, W. Va. This is the first of the government's standard plants to swing into operation, with an eventual capacity of 90,000 tons of GR-S annually. The photograph was taken during the official inspection of the plant, which took place on June 11. John P. "Jack" Coe, manager of U. S. Rubber's synthetic rubber division, can be seen in the background.

RUBBER-LIKE MATERIAL FROM JOJOBA NUT REPORTED BY GLIDDEN

An interesting report on the possibilities of a rubber-like material secured from the jojoba nut has been made by the Glidden Co., of Cleveland. Last year the company acquired a 640-acre desert farm near Florence, Arizona, for growing experimentally the jojoba bush producing this nut, which is said to yield, among other things, a liquid wax which can be used as a substitute for carnauba wax, a rubber-like material highly resistant to acids and alkalies.

The jojoba is a bush that grows wild in Arizona, New Mexico and Lower California. When wild, it grows about 12 feet high, but by careful selection and irrigation Glidden hopes to produce larger and better bushes. It takes about four years for the bush to begin producing nuts, after which it continues to yield every season. Although the bush is indigenous to arid regions, it is reported that it will not yield in years of drought.

The jojoba nut is about the size of a large peanut kernel. The hull contains one or two kernels. Interbreeding experiments are designed to develop the two-kernel variety for higher yields. No figures have been revealed as yet as to specific yields. The seed must be supplied from experimental farms, because deer, stock and other animals eat the nuts from wild jojoba before they can be gathered.

According to W. J. O'Brien, vice-president of the Glidden Co., laboratory tests have indicated that when the liquid wax of the jojoba nut is treated with sulfur chloride, a factice-like material is produced, which also has some interesting possibilities.

Latin-American Developments

The effort to secure larger shipments of rubber from Latin America continues with undiminished enthusiasm. Greater assistance in providing food, tools, medicines and transportation is reported in almost every Central and South American country. It was recently reported that there are now some 700 workers collecting rubber in Guatemala, upwards of 3,000 in Nicaragua, and more than 1,500 in Costa Rica.

American industry is of course playing an important role in aiding the Rubber Development Corporation secure increased rubber supplies from below the border. Although Goodyear supplies relatively large amounts regularly from its holdings in Costa Rica, it was recently learned that the William Wrigley, Jr., Co., the chewing-gum concern, furnished some 620 tons in the last five months of 1942 and expects to deliver 2,500 tons this year. This is largely Castilla rubber from Central America, where the company has extensive holdings. According to one Wrigley official, the company's rubber collection efforts are more patriotic than remunerative.

Some of the more important developments in various Latin-American countries, reported in recent weeks, follow:

Bolivia: Over a five-month period ended last February 3, Bolivia is reported to have produced nearly 1,700 metric tons of rubber, valued at approximately $1,750,000. The rubber came principally from the provinces of El Pando and Beni. Production in 1944 will total at least 6,000 tons, it is believed, or six times the 1941 production. Some 200,000 machetes, axes and knives, as well as rifles, shotguns and sewing machines, are said to have been received at Bolivian rubber ports in the upper Amazon.

Brazil: Last month (June) was designated by official decree as "Rubber Month" in Brazil, the proclamation coinciding with a campaign to intensify crude rubber production under the slogan "More Rubber for Victory." The current month (July) has been designated as "Scrap Rubber Month," and Brazilian students have been organized into scrap rubber clubs to canvass homes. As in the United States, during the nation-wide scrap rubber collection campaign last year, gasoline service stations are being used as collection depots. The scrap is being paid for at the rate of about one cent per pound.

Colombia: A "new rubber road," one of the many highways being built in Colombia to open rubber-producing areas, has been started to run from Villavicencio, a few miles south of Bogota, to the river port of Carreno, on the border between Colombia and Venezuela, where the Meta River joins the Orinoco. This new road will extend for more than 500 miles. Preparations are also being made to extend air transport for rubber-producing areas in the country, especially in the upper Amazon Basin.

Nicaragua: Despite tremendous difficulties, due to the fact that the rubber is in remote jungle terrain, Nicaragua is reported to have shipped more than 1,200 tons of rubber to the United States in the past year. This means that after only one year of large-scale rubber production, Nicaragua is becoming one of the most important sources of rubber for the United Nations in the Western Hemisphere. Special systems of food supply, medical aid and transportation are credited with the large-scale development.

Panama: The properties of the rubber plantation maintained in Panama by the Goodyear Tire & Rubber Co. are being transferred to the recently-established Inter-American Institute of Agricultural Sciences, which is headed by Dr. Earl N. Bressman, as director. The 2,800-acre plantation, established by Goodyear in 1935, is situated outside the Panama Canal Zone near Gatun. It is the third largest rubber plantation in the Western Hemisphere, after the Ford plantations in Brazil and the Goodyear plantation in Costa Rica. About 700 acres of the plantation now contain rubber trees. These trees will serve as a source of budwood for distribution to rubber growers throughout Latin America.

GOVERNMENT-OWNED SYNTHETIC PLANT AT BAYTOWN NOW IN OPERATION

Production of synthetic rubber at the government-owned plant in Baytown, near Houston, Texas, went into operation on June 28. The plant, which will have an eventual capacity of 30,000 tons of GR-S a year, is operated by the General Tire & Rubber Co., in conjunction with the General Latex & Chemical Co. Harvey J. Elwell, president of General Latex, is general manager of the plant. Butadiene will be supplied to the plant by the Humble Oil Co. and styrene will presumably be supplied by Monsanto Chemical Co.

The day production began at the new plant was designated as "American-Made Rubber Day" by Governor Coke R. Stevenson of Texas, and appropriate ceremonies attended the official opening, with William O'Neil, president of General Tire, and other company officials participating in the program held at Baytown. Later, the program moved to Houston where a civic luncheon for the visitors was held and exhibits of synthetic rubber products shown.

In a telephone address made from Washington to the special luncheon in Houston, Secretary of Commerce Jones predicted that the United States will have a completely integrated rubber industry, capable of meeting all essential needs, military and civilian. He added that manufacturing capacity of the synthetic rubber units would be capable of producing more than 800,000 tons a year by next December, "which is more than we have ever used and sufficient for our essential purposes."

Secretary Jones also paid high tribute to Rubber Director William Jeffers, stating: "Too much credit cannot be given to the Rubber Director and his staff. His insistence and determination that construction materials be made available, that all phases of the program be thoroughly checked, and that speed be the watchword, has been responsible for the early completion of the plants."

James J. Newman, vice-president of the B. F. Goodrich Co., pointed out in a statement issued in Dallas on June 24 that government-financed plants for the production of a total of 255,000 tons of synthetic rubber annually, or more than a third of the output scheduled under the government's entire program, will be in operation in Texas within the next 90 days. The 255,000 tons will be the total output of four units, as follows:

A 120,000-ton plant at Port Neches, with 60,000 tons of its capacity to be operated by Goodrich and 60,000 tons by Firestone; a 30,000-ton plant at Baytown operated by General Tire; a 45,000-ton plant at Borger operated by Goodrich; and a 60,000-ton unit at Houston operated by Goodyear. Goodrich built the plants at Port Neches and Borger; Goodyear built those at Baytown and Houston.

California Plant in Operation

According to a statement made by the California Synthetic Rubber Corp., the organization formed by Goodyear and U. S. Rubber, the $15,000,000 copolymer unit near Los Angeles, California, has begun operations. This plant, also government-owned and financed, will have an eventual capacity of 90,000 tons of GR-S annually.

BUTADIENE

Some data concerning the production of butadiene from grain without first transforming the grain into alcohol was furnished recently by the Schenley Distillers Corporation. At the same time it was revealed that Schenley has constructed a large-scale pilot plant at its Lawrenceburg, Indiana, distillery and, under the direction of Dr. A. J. Liebmann, has made considerable progress on the new process.

There are three main steps in producing butadiene from grain by the short-cut process developed by Schenley, in cooperation with the Northern Regional Research Laboratory of the Department of Agriculture at Peoria, Ill. These are: (1) Bacterial production of butanediol from grain mash; (2) Esterification of the butanediol to butanediacetate; (3) Pyrolysis of the butanediacetate to butadiene.

The important points in these three steps follow: Grain used in producing butadiene is ground into meal, and then dumped into mash tubs, where, after the addition of pure water, the mixture is cooked by steaming. The mash is withdrawn from the cookers and pumped to a large fermenter.

A special bacteria culture, carefully prepared in the laboratory, over a 24-hour period, is introduced into a small tank above the fermenter, and a nourishing material added, upon which the bacteria feed. In the small tank the bacteria increase rapidly until it becomes necessary to transfer the microscopic organisms to a 700-gallon tank, and from there to the fermenter.

Just as yeast changes grain sugars into alcohol, the bacteria convert the grain starches, or the grain sugar, into butanediol. After fermentation, the resulting "distillers beer" is allowed to settle and the clear liquid is drawn off, or filtered, ready for the recovery of butanediol.

The "beer" is pumped to an evaporator for concentration and elimination of much of the surplus water. The solution is then pumped to an extraction column. Here a solvent, butanol, enters the picture. Butanol is pumped into the bottom of the column, where, being lighter than the butanediol-water solution, it passes upward as the solution moves downward. In rising to the top of the column, the butanol mixes with the butanediol and absorbs it, the water passing off at the bottom of the column. To remove the butanol (for re-use) from the butanediol, the liquid is passed through a still.

To obtain butadiene, the butanediol is esterified with acetic acid. Thus is formed diacetate of butanediol, which is next "cracked," by heating to relatively high temperature in a melted lead "bath." This cracking produces butadiene as a gas.

Early laboratory research in this country on the production of butanediol was launched at Iowa State College, Ames, Iowa, and in 1939 the Northern Regional Research Laboratory decided to investigate the practicability of commercial production as soon as a new laboratory, then under construction, was completed. In 1940, after this laboratory was finished, research studies were begun under the direction of Dr. O. E. May, now research coordinator of the Department of Agriculture in Washington.

Later, a pilot plant was begun by the laboratory staff in Peoria. Based on the work accomplished, the Baruch Committee included the process in its report and recommended further investigation. Similar research operations with the process had meanwhile been initiated at the Schenley Research Institute, in Lawrenceburg, under the direction of Dr. Liebmann. The latter studied the work under way in Peoria and arranged for cooperative work between the two organizations. Shortly thereafter plans were begun for the construction of the large-scale pilot plant by Schenley, leading to the development discussed.

First Koppers Unit Started

The first of the four 20,000-ton butadiene units at Kobuta plant of the Koppers United Co., near Pittsburgh, Penna., largest in the government's program, began preliminary operations around July 1. The other three butadiene units and the styrene unit at Kobuta are scheduled to go into operation during the summer, with full production expected by fall. About 1,000 operating employees will be at work at the finished plant.

The full capacity of the Kobuta plant will be 80,000 tons of butadiene and 37,500 tons of styrene annually. Styrene will be produced by combining ethylene with benzene, and the butadiene will be made from ethyl alcohol, fermented and distilled from wheat, corn or molasses. The plant covers an area of 200 acres in all.

In order to provide additional living accommodations for operating employees at Kobuta, a new Federal housing development of 300 units has been started in a wooded site about three-quarters of a mile below the plant. The development is scheduled to be completed by September. It will include a school, a store and bus station, playgrounds, and a community building.

Word has also been received that full scale production has been achieved six weeks ahead of schedule at the styrene plant built and operated by the Dow Chemical Co. in Los Angeles. This plant is located adjacent to a butadiene plant operated by the Shell Oil Co. and the copolymer unit operated by the California Synthetic Rubber Corp.

GOVERNMENT-OWNED PLANT OPERATED BY FIRESTONE NOW IN COMPLETE OPERATION

The entire government-owned synthetic rubber plant in Akron operated by the Firestone Tire & Rubber Co., pictured above, is now in full production. The unit in the background has been in operation since April of last year. The production from this plant is equal in capacity to more than 200,000 acres of rubber trees, according to Firestone, while completion of two other synthetic rubber plants by the company in the south will make the company's total capacity equal to 1,000,000 acres of trees. Only one employee is necessary in these plants for every 100 who would be needed to produce the same amount of natural rubber.

Announce New Alcohol Process

Large-scale production of grain alcohol for synthetic rubber, motor fuel and other industrial purposes was predicted by Frank G. Handren, president of Park & Tilford Distilleries, Inc., when he announced a new distillation method on June 12. The new method, discovered by government scientists, is said to result in economies that will slash grain alcohol costs in half, putting this form of alcohol on a competitive footing with molasses and synthetic alcohol.

The discovery was made at the Park & Tilford Distillery in Brownsville, Pa., by Irvin W. Tucker, young chemist in the U. S. Department of Agriculture, and Dr. A. K. Balls, chief of the department's enzyme research laboratory. Four months of research, during which the government scientists made use of Park & Tilford distilling facilities, preceded the discovery. The process was then developed to commercial scale by Park & Tilford.

The cost of producing grain alcohol under present methods is about double that of synthetic and molasses alcohol. This disparity in cost has prevented use of grain alcohol for most industrial purposes in the past. The government, of course, is paying the additional cost for alcohol from grains because it is so vitally needed in the war effort. It is claimed that the Balls-Tucker process not only will eliminate this extra cost from war-alcohol made from grain, thus saving the government $50,000,000 a year, but it will also open the door to post-war opportunity for grain alcohol.

One reason for the lowered cost under the Balls-Tucker process is that use of barley malt, the most expensive single ingredient in grain alcohol production, is eliminated. Another factor is the concentrated protein the new process extracts as a by-product. This protein can be sold for five cents a pound. About three pounds per gallon of alcohol—or a billion pounds a year for the distilling industry—can be extracted.

"EMERGENCY TIRES" ARE MADE AVAILABLE FOR RATIONING AS SPARES

Approximately 1,000,000 to 1,500,000 used tires, part of the 12,000,000 collected from motorists under the Idle Tire Purchase Plan last year, which are unfit for recapping but can be made serviceable for limited emergency use are being added to the supply of used and recapped tires available for rationing as spares and to low-mileage passenger car drivers, according to a plan announced by Rubber Director Jeffers on June 21.

These tires will be called "emergency tires" and will be branded with an "O" pressed into the sidewall to identify them. They can be purchased from regular dealers by motorists getting rationing certificates for Grade III tires. None of the "O" branded tires are to be recapped prior to sale. The tires are held by the Defense Supplies Corporation and the mechanics for moving them downstream have been established.

Ceiling $1.00 Per Tire

A ceiling price of $1.00 per tire was set on the unrepaired "emergency tires" by OPA on June 22. This is contained in Amendment No. 12 to MPR 107 (Used Tires and Tubes). Maximum additions to this price are also provided for the tires when they are given emergency repairs before being sold to the users. Dealers will buy the tires from the Defense Supplies Corp. at 50c each. The ceilings set in the amendment do not change the maximum prices for tires repaired with vulcanizing repairs which meet previously existing qualifications of salable tires.

Provision for the retail sale of the "O" branded unrepaired used tires, the sale of which was formerly prohibited, is contained in Administrative Exception Order No. 47 to Ration Order 1A, effective June 25.

Set New Government Prices

Under the terms of Maximum Price Regulation 415 (Certain Federal Government Purchases of New Tires and Tubes), issued on June 28 and effective July 1, prices for new rubber tires and tubes listed by the Procurement Division of the Treasury Department are established as maximum prices for sales of new tires and tubes to the Federal Government, except to the War and Navy Department, Defense Supplies Corp., and the Rubber Development Corp. The ceilings covered in the new regulation supersede those established in Temporary Maximum Price Regulation No. 31, which froze procurement division list prices as ceilings until issuance of the present regulation.

The new regulation—MPR 415—sets specific maximum prices for tires, tubes and flaps. It in no way affects prices of tires and tubes sold for civilian use. Some items that are not on the procurement division price lists are added to the regulation at prices in line with those on the lists. Flaps are listed separately because they are being bought separately at present, although both casings and flaps have been included in tire prices on current lists.

Maximum prices given in the regulation take into account additional expense sometimes incurred in sales to Lend-Lease and other government agencies, and therefore no additions for such expense may be added to the prices. In the case of passenger car tires and tubes, no additions are allowed to prices for costs of the Dealer Tire Return Plan unless the tires and tubes involved have been turned into the official government pool.

Establish Tire Mileage Rates

Specific maximum prices for the supply of tire mileage and servicing of tires and tubes furnished to operators of buses and taxicabs under tire mileage contracts have been established by OPA. Rates are established in a new regulation —MPR 414 (Tire Mileage)—which became effective July 2. The rates cover either per tire mile or per vehicle mile, according to the contract.

The action establishes a uniform ceiling for the industry in proper relation to the March 1942 level of rates currently in effect, but permits adjustment of individual rates to level out abnormalities and to keep them adjusted to changing operating conditions. Returns to the manufacturers are roughly comparable to the prices at which tires are normally sold to commercial tire users. The regulation has no effect on individual consumers.

Large Tire Makers Affected

Chiefly affected are five of the largest tire manufacturers, who supply more than 90 per cent of the tire mileage sold in the United States. Tire mileage is bought by about 1,000 users, such as owners of fleets of buses, who spend about 15 million dollars a year for such tire mileage service.

Since August 19, 1942 tire mileage rates have been frozen at the March 1942 level by Maximum Price Regulation 165 as amended, but the freeze ceiling method caused abnormalities in the relationship between rates. Therefore MPR 165 is superseded by the regulation issued today as to the maximum prices for all tire mileage.

Supersedes Other Regulations

The new regulation supersedes provisions relating to tire mileage, termination sales, and transfers of tires and tubes under tire mileage contracts in other regulations and price schedules. This was accomplished by the issuance of the following amendments to the orders listed: Amendment No. 10 to MPR 107 (Used Tires and Tubes); Amendment No. 24 to MPR 165 (Services); Amendment No. 12 to RPS 63 (Tires and Tubes); and Amendment No. 3 to RPS 66 (Retreaded and Recapped Tires).

Maximum prices for servicing of tires and tubes not owned by the supplier of the tire mileage are established at $.001 per vehicle mile for a vehicle with six wheels. The rates for vehicles with more or less than six wheels are proportionately more or less than that for the six wheeled vehicle.

Tire Quotas for July

The apportionment of district quotas for passenger car and truck tire rationing in July was announced by OPA on

June 30. The total quota of Grade I tires was set at 1,061,261, compared with 1,012,000 for June. The quota for Grade III tires is 414,931, which compares with 690,000 for the previous month.

July truck tire quotas total 414,977, compared with 414,066 for June. Inner tube quotas for the month were set at 736,500 for passenger cars and 332,056 for trucks, compared with 828,000 and 338,606, respectively, for June.

The decrease in the quota of Grade III tires (used or recapped passenger car casings) is the result of the recently-announced change in the rationing regulations restricting eligibility for tires of this kind to drivers with a mileage of 240 a month or less who qualify under specific conditions.

Amendments to Ration Order

Five additional amendments to Ration Order 1A (Tires, Tubes, Recapping and Camelback) have been issued since our last number, as follows:

Amendment No. 34, issued June 15 and effective June 21, sets up rules under which the purchaser of a used car may qualify for a gasoline ration to operate it, even though he is unable to get a Tire Inspection Record from the previous owner. If the buyer is unable to present the record, he must satisfy the local board that no Tire Inspection Record ever was issued for the vehicle or that he has been unable to get it from the previous owner after diligent attempt.

Amendment No. 35, issued June 29 and effective July 1, reduces the number of low mileage passenger car drivers eligible for used and recapped tires. The action, temporary in nature, was taken because of a temporary shortage in supplies of these casings in serviceable condition.

Amendment No. 36, issued June 29 and effective July 6, removes the limit on the number of times replenishment portions of tire rationing certificates can be transferred from hand to hand within the trade. Previously, the certificates became void after the fifth such transfer.

Amendment No. 37, issued July 3 and effective July 10, makes it clear that the ration order applies to all transactions between the Continental United States and the territories and possessions of the United States, as well as to the forty-eight states and the District of Columbia.

Amendment No. 38, issued on July 14 and effective July 20, removes the ration restrictions on the sale of used solid tires to encourage their use by truck operators who otherwise would have to have new tires. Stocks of used solid tires, which hereafter may be purchased without rationing certificates, total only about 1,000. Three other minor changes in the regulations are made by the amendment.

Certain conditions governing the transfer of tires and tubes in territories and possessions of the United States were changed by OPA with the issuance of Amendment 1 to Supplement 1 of Ration Order 1A. The amendment became effective June 9. Tire regulations for Puerto Rico were established in Ration Order 1B, issued on July 10.

Procedure for Tire Pricing

A procedure for pricing new rubber tires and tubes of types made only since 1941 for the original equipment of automotive vehicles is provided in Amendment 4 to MPR 119 (Original Equipment Tires and Tubes), issued by OPA on June 25 and effective June 30. Prices for the new items must be in line with those for original equipment tires and tubes such as were sold in 1941. Current maximum prices for 1941 type tires and tubes were set, beginning April 27, 1942, at levels 5% higher than 1941 prices.

The new amendment provides that in establishing maximum prices for tires and tubes of types not sold during 1941 for original equipment but made and sold since then for such use, the seller must submit suggested maximum prices to OPA. The prices must be accompanied by a description of the pricing method and other information specified in the new regulation.

Outsized Tires Permitted

On June 27 the Office of the Rubber Director announced that tire manufacturers will be permitted to manufacture any odd or obsolete tire sizes from synthetic rubber in the future. Heretofore tire makers have been forbidden to use synthetic rubber for any except the two standard sizes: 6.00-16 and 6.50-16.

Each manufacturer now will be permitted to build any size up to a 60-day inventory. It was stated that there would be no possibility of excessive consumption of synthetic rubber through this provision, inasmuch as no manufacturer will be inclined to produce more of the odd-sized tires than he could sell.

Latest Technical Aids

Included among technical bulletins distributed in recent weeks by the so-called Educational Committee of the Office of the Rubber Director, which is headed by Dr. H. E. Simmons and John Ball, were those devoted to the use of GR-S in hard rubber, GR-I in inner tubes, and one on the compounding and use of GR-S for mechanical goods. All three of these bulletins are strictly confidential and copies can be secured only by recognized rubber manufacturers. Requests should be sent to the attention of either Dr. Simmons or Mr. Ball.

Additional "E" Awards

Included among companies receiving the Army-Navy "E" award for production efficiency in recent weeks were the following:

Bristol Co., Waterbury, Conn.

Brown Instrument Co., Philadelphia, Penna.

Detroit Gasket & Manufacturing Co., Burt Road Plant, Detroit, Mich.

Taylor Instrument Cos., Rochester, N. Y.

CHEMICAL SHOW FACTORS OUTLINED BY MANAGEMENT

As previously announced, the 19th Exposition of Chemical Industries will be held at Madison Square Garden in New York City from December 6 to 11. The combination of circumstances leading up to the demand that the show be held at its scheduled biennial interval includes the following factors, according to Charles F. Roth, manager of the exposition:

First, the war production program has passed the plant expansion stage and emerged into the stage of production with existing facilities. Progressively through the next twelve months, this will relieve and permit the construction industry and many producers of mill equipment and machinery to seek new activities.

This capacity will in part be absorbed by the second element in the picture, which is the rapid obsolescence of all kinds of plants, including those engaged in civilian work. The need for replacements, changes and betterments in industry is becoming more insistent every day.

A third element is the rapid development of substitutes and alternatives in response to the curtailment of normal resources. One of the most stimulating aspects of the times is outlined in the situation of the substitutes, however, for many of them, instead of being substitute products, are seen as the basis of new industries which are destined to survive the war and assume a permanent place in the industrial future.

An important bearing of these considerations is the determination of industrialists to prepare to meet post-war problems promptly, when they arise. This requires not only thorough preparation, but thorough knowledge of what coordinate industries are doing.

Use of Elastic Vinyon

The entire output of elastic Vinyon, manufactured by the American Viscose Corp., is currently going into military equipment or into articles connected with war activities, where it is replacing rubber, it was recently revealed. It is being used by the Army for the canopy suspension cords of jungle hammocks, and is also being used in the waistbands of the underwear and exercise uniforms issued to the WACs. Other uses include elastic tapes for industrial workers' goggles and metatarsal pads.

Neoprene Price Reduced

Effective July 10, the price of Neoprene Type GN has been reduced to 28c per pound in all quantities f.o.b. Carney's Point, N. J. An additional charge of 2c per pound will be made to cover transportation and handling costs shipped from the company's West Coast warehouse. The announcement was made on July 10 by the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc.

INTRODUCTION OF SOME NEW RUBBER AND PLASTIC DEVELOPMENTS AND SYMPOSIUMS FEATURE GOODYEAR LABORATORY DEDICATION

The new Goodyear Research Laboratory at Akron was officially dedicated last month with elaborate ceremonies, including a two-day scientific program featuring four symposiums, held on June 22 and 23. The symposiums covered synthetic rubber, plastics in war and peace, the future of chemistry, and the future of transportation. Fourteen addresses in all were given, each one by outstanding experts and technologists.

The laboratory, fully described elsewhere in this issue, was built at a cost of $1,325,000, and contains some of the latest tools of scientific research, including an electron microscope, an analytical spectrograph, and an infra-red spectrometer, the latter built by Goodyear engineers. It features a "cold room," a semi-commercial pilot plant, and dozens of individual laboratory rooms.

On June 21, the day preceding the official dedication program, a number of new rubber and plastic developments were shown and demonstrated to a large group of newspaper and magazine writers. These included Plioflex, a vulcanizable elasto-plastic; Plastic Foam, a plastic insulation material made from resin, useful as a wartime replacement for foamed sponge rubber; the Cycleweld process of bonding vulcanized rubber or synthetic rubber to metals or plastics or metal to metal, wood or plastics; a radio static neutralizer which will eliminate static whether due to atmospheric conditions or man-made machines; and a new instrument which uses sound waves to detect defects in tires. In addition, the writers were taken through one of the new postwar homes developed by Goodyear's home-planning department which can be loaded and transported intact on trucks or railroad flat-cars, some of which are already in use for housing workers at Goodyear Aircraft.

Description of New Materials

Plioflex, the new elasto-plastic, like rubber, is vulcanizable. Although it is not a Vinylite, having an entirely different chemical formula, it has many of the characteristics of Vinylite in its natural state. The tensile strength of the new material can be improved from 100 to 200% during vulcanization. One type of Plioflex that has excellent flex characteristics, good physical properties, and can be chilled to —50° F. without becoming brittle, has already been prepared. Goodyear believes that the new material will be used for molding automotive parts, heels and soles, jar rings, impregnating fabrics, and similar applications. The problem of developing proper plasticizers and pigmentation combinations is now under investigation.

Plastic Foam, the new resinous insulation material, resembles Airfoam but is said to be generally superior to the rubber product. It is highly resistant to the transference of heat, as well as being inflammable and waterproof. It is also practically as resilient as Airfoam. The new material, now being turned out in limited quantities for insulating warplane cabins against heat and cold, is being made in two types—a plain type and an impregnated type. Reinforced with cheesecloth or other fabric, the plain type is sufficiently strong to be handled freely, but is somewhat susceptible to shock. The impregnated material's resilience is increased and fragility decreased by adding a flexible substance. Plastic Foam is lighter than balsa, felt or any other known insulating material.

The Cycleweld adhesive process, which utilizes a cement the composition of which is a war secret by order of the U. S. Patent Office, is based on research initiated by the Chrysler Corp. and turned over to Goodyear for study and improvement. In application, the proper cement is applied to the surfaces to be bonded together and "cured" in a suitable furnace under considerable heat and pressure. In the case of the metal-to-metal bond, the cement has been developed into the form of a film or tape and it is merely necessary to place this tape between the parts to be bonded together and then apply the heat and pressure. In this use, cyclewelding is a direct competitor of riveting and spot-welding, in comparison with which it shows both superior strength under static load and in resistance to vibrational stresses.

The apparatus designed to use sound waves to detect defects in tires was primarily developed to locate so-called ply separations. The tire to be inspected is demounted from the rim and hung on two rollers in such a way that the bottom portion of the tire passes through a shallow tank of water as the tire is revolved. Sound waves of supersonic frequency are generated in this tank of water by the vibration of a nickel rod, which is set in vibration by means of a frequency electric current which passes through a coil of wire surrounding the rod.

The vibrations so generated are picked up by a microphone which is so mounted as to be always inside the portion of the tire which is immersed in water. The microphone in its turn operates a relay box equipped with a green light and a red light. As long as the tire is solid, the supersonic vibrations pass through it with full intensity to the microphone, which causes the green light to stay lit. If there is a separation in the tire, however, the supersonic waves are reflected back by the air gap and therefore do not get through the tire with full intensity, thus causing the green light to go off and the red one to light.

The static neutralizer was originally developed to eliminate static from radio sets on airplanes but has been found equally useful on radios under any circumstances. It makes use of small electronic tubes in such a way that they are automatically adjusted to each radio signal, whether weak or strong. The tubes serve to discriminate between static and the desired signal and automatically control the amount of static energy which can pass through the radio. The device is simple, compact and rugged and can quickly be built into any radio set. It will not become available to the public until after the war.

Symposium on Synthetic Rubber

The Symposium on Synthetic Rubber, with George K. Hinshaw, manager of Goodyear's foreign operations, presiding, was held at the laboratory on the morning of June 22. It featured papers on "Butadiene," by Dr. Per K. Frolich, Director, Chemical Division, Standard Oil Co.; "Synthetic Rubber Application," by Dr. Norman A. Shepard, Chemical Director, American Cyanamid Corp.; and "Synthetic Rubber Research," by L. B. Sebrell, Manager of Research and New Products for Goodyear. An address of welcome was first made by P. W. Litchfield, president of the company.

Dr. Frolich discussed the three general classes for producing butadiene which at the present time are considered of immediate or potential commercial interest, namely, reaction dependent upon building up the butadiene structure from materials containing only two carbon atoms in the molecule; reactions based on the conversion of suitable C_4 compounds into the diolefin structure; and reactions involving decomposition of molecules containing more than four carbon atoms. Among those described were the aldol, alcohol, glycol, chlorination-dehydrochlorination, and petroleum processes.

Dr. Shepard, the second speaker at this symposium, first reviewed some of the research achievements credited to the Goodyear organization, mentioning some of the scientists involved, including Bedford, Hand, Kelly, North, Park, Scott and Spear. He then reviewed some of the difficulties experienced in handling the synthetic rubbers, including GR-S, butyl rubber and the various specialty types, outlining some of the specific research steps undertaken by the Office of the Rubber Director, with which he is currently associated, to surmount these difficulties. In concluding his talk, Dr. Shepard urged that fundamental research on rubber be continued in the post-war period in a central laboratory supported by industry by applying a tax of 1/5th of a cent per pound on rubber consumed.

The final speaker at this session, Dr. Sebrell, traced the development of synthetic rubber research from 1875 to the present. He gave several comparisons, supported by graphs, between natural and synthetic rubbers, and pointed out some of the serious defects still apparent in the use of the synthetics, particularly in flexing characteristics and in tear resistance. He urged that studies be launched of the fundamental properties of synthetic rubber to the end that the nature of the

vulcanization process be changed to overcome some of the undesirable properties now inherent in such rubber.

At a luncheon tendered by Goodyear to visitors and guests following this symposium, an address was given by Dr. R. P. Dinsmore, whose election as vice-president in charge of research was announced during the dedication ceremonies. Dr. Dinsmore reviewed the entire synthetic rubber program launched by the government, including the steps leading up to the decision to go all-out on synthetic. He outlined some of the difficulties still facing the American rubber manufacturing industry in the use of synthetic, but was emphatic in his belief that they will all be overcome, the best guarantee of success being the fact that "the industry is awake to the seriousness of the problem and is throwing all its skill into the balance for a solution."

Additional Symposiums Held

Three additional symposiums were held during the two-day program. The second —on Plastics—was held on the afternoon of June 22, with C. Slusser, Goodyear vice-president, presiding. This symposium featured talks on "Phenolic and Vinyl Resins," by Dr. T. S. Carswell, Research Director, Plastics Division, Monsanto Chemical Co.; "Acrylate Plastics," by Dr. D. S. Frederick, Rohm & Haas Co.; and "Urea Formaldehyde Resins," by Dr. A. M. Howald, Research Department, Plaskon Division, Libbey-Owens Ford Glass Co.

The Symposium on the Future of the Chemical Industry was held on the morning of June 23, with Dr. Sebrell presiding. Three papers were presented, as follows: "Aladdin's Lamp," by Leland I. Doan, Vice-President, Dow Chemical Co.; "Future of Industrial Research," by Dr. E. R. Weidlein, Director, Mellon Institute; and "Nylon, Its Development and Use," by Dr. G. P. Hoff, Technical Director, Nylon Division, DuPont.

Dr. Weidlein, who has been closely associated with the government synthetic rubber program since its inauguration, stated in his talk that the pooling of scientific information furnished by the rubber chemists with the knowledge and assistance of their companies greatly speeded up the program. He added that it required the assistance of the government to establish the industry on so large a scale in so short a time, and said that changes are so rapid and will continue to be so rapid in the future that the entire synthetic rubber industry might be obsolete within a period of five years, which is the span in which the government has planned to liquidate its investment.

At the luncheon held on June 23, over which Dr. Dinsmore presided, an interesting talk on "University Research—Now and in the Future" was given by Dr. Harry Holmes, head of the chemical department at Oberlin College. Using the term "university" to include medical, engineering, and agricultural schools, as well as graduate schools and colleges, Dr. Holmes warned that there must be no curtailment in university research work, since it is upon such work that post-war industry will build. He pointed out the opportunities industry has to support such research and urged manufacturers to contribute to the maintenance of research facilities.

The final symposium—on the Present and Future of Transportation—was held on the afternoon of June 23, with W. S. Wolfe, factory manager of Goodyear, in the chair. Dr. Jerome C. Hunsaker, National Chairman of the Advisory Committee for Aeronautics, gave a paper on "Research and Post-War Aviation;" Dr. A. B. Culbertson, Manager, Product Application Department, Shell Oil Co., discussed "Petroleum's Contribution to Transportation;" and Mr. Litchfield talked on the "Development of the Tire."

A fitting climax to the two-day dedication ceremonies was a dedicatory dinner, held on the evening of June 23 at the Hotel Mayflower, during which Mr. Litchfield was presented with a special book containing the signatures of all of the employees of the research division of the company. In acknowledging the book, Mr. Litchfield gave full credit to the decision to build the new laboratory to E. J. Thomas, president of the company, who in turn pointed out that tremendous pressure was exerted on him by some of the company's research officials.

Gen. Barnes Principal Speaker

Major General C. M. Barnes, Chief, Technical Division, Office of the Chief of Ordnance, War Department, Washington, D. C., was the principal speaker at the dinner. General Barnes first told of the important role played by rubber products of all kinds and types in the overall war effort, and then discussed a recent trip he made to the fighting front in North Africa. His talk was made more interesting by the use of a giant-sized map, hung on the wall behind the speaker, from which the audience was easily able to trace the General's trip, made largely by air.

Offer Labor Bulletins

Three interesting booklets, published in response to widespread requests for assistance on the matters covered, and representing the experience and judgment of people close to war production problems and experts in the field, have been made available by the Division of Labor Standards, U. S. Department of Labor, Washington, D. C. The booklets are: *Safety Speeds Production* (Special Bulletin No. 10); *A Guide to the Prevention of Weight-Lifting Injuries* (Special Bulletin No. 11); and *Controlling Absenteeism—A Record of War Plant Experience* (Special Bulletin No. 12). Bulletin No. 10 can be secured from the Division of Labor Standards without cost. Copies of Bulletin Nos. 11 and 12 can be secured from the Superintendent of Documents, Washington, D. C., for 10c each.

Buffalo Meets September 16

The next meeting of the Buffalo Group, Rubber Division, A.C.S., of which Burt W. Wetherbee of the Globe Woven Belting Co., is chairman, will be held on Thursday, September 16, at the Hotel Westbrook, in Buffalo. G. W. Cassell and E. R. Martin, of the Buffalo plant of the General Cable Corp., are in charge of arrangements. The program will be announced shortly.

One of the get-together groups at the official dedication of the Goodyear Research Laboratory held in Akron on June 22 and 23. From left to right: E. J. Thomas, Goodyear president; Dr. Per K. Frolich, Standard Oil; P. W. Litchfield, Goodyear chairman; and Dr. Norman A. Shepard, American Cyanamid. Drs. Frolich and Shepard participated in the symposiums which featured the dedication.

Titanium Cartel Charged

National Lead Co., E. I. du Pont de Nemours & Co., and the Titan Co., Inc., a subsidiary of National Lead, were charged with the creation of a world-wide cartel in titanium compounds in an indictment handed down by the Federal Grand Jury in New York City, on June 28. The indictment charged conspiracy with German, British, Italian, Japanese and other foreign interests, including I. G. Farbenindustrie, Imperial Chemical Industries, and Kokusan Kogyo Kaibushihi. Officials of the three chemical companies were also named in the indictment. It was pointed out by one of the defendant corporations that the contracts scored by the Department of Justice went back over 20 years, many of which have resulted in great wartime benefits to the United States.

Chicago Outing on August 14

The Chicago Group, Rubber Division, A.C.S., will hold its annual summer outing on August 14 at the Nordic Hills Country Club, which is about one quarter mile south of Irving Park Boulevard on Route 53. The usual entertainment and prizes will be supplied, but this year the affair is to be strictly stag. The committee in charge of arrangements includes Jim Sheridan (N. J. Zinc) as chairman, and Calvin Yoran (Wishnick-Tumpeer), Dick Huizenga (Inland Rubber), and Bert Stangor (Chicago Belting).

Elected Firestone Secretary

Harvey H. Hollinger, controller of the Firestone Tire & Rubber Co., Akron, for the past 15 years and a director since 1930, has been elected secretary of the company to succeed the late B. M. Robinson. C. A. Pauley, head of the auditing division, who has been with Firestone since 1931, has been elected controller.

Double-Purpose Barges

According to a report broadcast by a Japanese news agency, recorded by one of England's listening posts, the Japanese have completed tests on large barges made of rubber that, on arrival at their destination, can be unloaded and converted into rubber products of all types. These barges will be used, according to the report, to carry raw materials to Japan from conquered countries in the South Pacific. Raw rubber is said to be treated by a special process to stand various stresses by varying its thickness. The rubber can be used for all parts of the keel and hull. The barges are motorless and will be towed by ordinary power-driven vessels.

Washington Appointments

WILLIAM S. RICHARDSON, general manager, Industrial Products Sales Division, B. F. Goodrich Co., Akron, has been elected chairman of the OPA Mechanical Rubber Goods Industry Advisory Committee.

B. F. STAUFFER, assistant general manager, Industrial Products Sales Division, B. F. Goodrich Co., Akron, has been appointed a member of the OPA Manufacturers Rubber Drug Sundries Industry Advisory Committee.

Liberalized terms for the issuance of licenses to American business under patents seized from enemy owners have been announced by the Office of the Alien Property Custodian. Beginning August 1, the fee for obtaining a license to use such patents will be a flat $15.00 for each patent.

More Names in the News

LEROY "TOMMY" TOMKINSON, general superintendent of the Goodyear Tire & Rubber Co., Akron, was presented with his 25-year service pin last month. He came directly to Goodyear from the University of Akron.

RAYMOND E. RYAN, purchasing and contracting officer for rubber footwear at the Boston (Mass.) Quartermaster Depot, was recently promoted from first lieutenant to captain. Prior to being called to active duty from the Reserve Corps in 1942, CAPT. RYAN was civilian chief inspector of rubber footwear at the Boston Depot.

WILLIAM F. LUND, manager of the Insurance Division of the U. S. Rubber Co., was recently elected a divisional vice-president of the American Management Association. He will handle insurance activities.

Oscar Nelson, president of the United Carbon Co., recently sold Morlunda Lan Domino, an Eastern-bred Hereford bull, for $10,000 to E. B. Yancey, a DuPont official. The bull, bred and developed on Mr. Nelson's farm, was a consistent prize winner. Mr. Nelson had previously refused several offers for the bull before selling it to Mr. Yancey, an old-time friend.

The broadcasting of music and news on regular schedules in the plant of the Electrix Corporation in Pawtucket, R. I., is reported to be an excellent morale builder by Irving L. Shein, vice-president and general manager of the company. Absenteeism is not a serious problem of the concern, according to Mr. Shein.

Goodrich has announced that industrial rubber-covered rolls are now being made with Ameripol. Rolls made with this synthetic are currently restricted to war orders with the highest ratings.

Officers of the Los Angeles Rubber Group for the 1943-44 Season

CHARLES J. ROESE
Goodyear Tire & Rubber Co.
Chairman

AL. PICKARD
Braun Corporation
Vice-Chairman

CHARLES M. REINKE
Reinke-Hiller and Amende
Secretary

CURTIS R. WOLTER
U. S. Rubber Company
Treasurer

MICRONEX

W-6

A COLUMBIAN COLLOID

There are good reasons why more MICRONEX W-6
is used than any other easy processing channel black

BINNEY & SMITH CO. · COLUMBIAN CARBON CO.

DISTRIBUTOR MANUFACTURER

MICRONEX W-6

In the sphere for which it is designed MICRONEX W-6 offers the same degree of uniformity and reliability as has always characterized Standard Micronex.

While a distinct difference exists in the processing qualities and in the resilience developed in vulcanized GR-S compounds as between Micronex W-6 and Standard Micronex, the spread is not as great as between the general run of easy processing and medium channel grades.

This is because Standard Micronex is also a good processing black and a fast curing black. Each grade has its own best place in the GR-S compounding picture and where heat build up is not a serious question and tear resistance and full reinforcement are most essential, Standard Micronex will continue to be used.

Our Technical Service Department is prepared to cooperate in adapting the most suitable Micronex type to your synthetic compounding requirements.

●

STATEX — *The Black of Today*

A new colloidal carbon for reinforcing natural and synthetic rubber contributes: REINFORCEMENT — resistance to abrasion • COOL RUNNING — high rebound, low hysteresis • FAST CURING — high pH promotes vulcanization.

FURNEX — *The High Resilience Black*

Contributes: GOOD TENSILE STRENGTH in GR-S without loss in rebound resilience • HIGH LOADING CAPACITY • EASY AND SMOOTH PROCESSING • IMPROVED AGING.

COLUMBIAN COLLOIDS

BINNEY & SMITH CO. • **COLUMBIAN CARBON CO.**

DISTRIBUTOR MANUFACTURER

OUTSTANDING MEETING HELD BY A.S.T.M. IN PITTSBURGH

With a registered attendance of 1452 members, committee members and guests, and 245 technical committee meetings at each of which there was excellent attendance of members, the 46th Annual Meeting of the American Society for Testing Materials, held in Pittsburgh, Penna., from June 28 to July 1 was outstanding.

In addition to the committee meetings, the four-day session featured a special report by Committee E-9 on research, which indicated notable advancement in a large number of the society's research investigations in both field and laboratory work; presentation of the 18th Edgar Marburg Lecture, delivered by L. J. Markwardt, chief of the Division of Timber Mechanics, Forest Products Laboratory, Madison, Wisconsin; the awarding of the Charles B. Dudley Medal to Walter Bonsack, chief metallurgist and director of research laboratories of the National Smelting Co.; and the annual report of the society's Executive Committee.

Meeting of Committee D-11

At the meeting of Committee D-11 on Rubber Products, some indication of the active work conducted by the committee during the past 18 months was given by the acceptance of four new standards. These specifications and tests, which will be published for a year or more as tentative, cover the following: (1) Low-Temperature Brittleness of Rubber and Rubber-Like Materials; (2) Compressed Asbestos Sheet Packing; (3) Insulated Wire and Cable; Polyvinyl Insulating Compound; (4) Rubber and Synthetic Compounds for Automotive and Aeronautical Applications.

The test first listed is for use in evaluating the resistance to freezing temperatures of rubber and synthetics used in automotive and aeronautical products. The use of motorized equipment in extremely cold climates by the Armed Forces and the increasing altitude of flight now being attained by airplanes have created many problems involving the resistance of materials to the extreme conditions which they must withstand. These problems are, of course, new and little work has been done in the past either on the properties of materials or on the methods of testing them under these extreme conditions.

The new method determines the ability of compounds made from rubber or rubber-like materials to resist the effect of low temperatures in causing them to become brittle so as to fracture or crack when bent. Standard specimens are exposed to specified low temperatures for definite periods after which the specimens are bent in a prescribed manner and any fracture or cracking noted. The procedure is commonly called the "Thiokol" method.

The methods of testing compressed asbestos sheet packing gives in the form of a consolidated standard a number of test procedures suitable for use in evaluating this material. Packing of this type is used for a variety of purposes but particularly as a gasketing material where severe services are encountered, such as those involving resistance to heat, heavy compression or, in the case of synthetic packing, resistance to organic solvents. Large quantities of this material are now being used in aircraft engines and the need for standardized test methods has become even more urgent.

The specifications for insulated wire and cable (polyvinyl insulating compound) are very urgently needed to provide standardized requirements for a rubber substitute. Insulation compounds for electrical wires and cables made from polyvinyl chloride or from copolymers of vinyl chloride and vinyl acetate were in use to a limited extent prior to the war. In these compounds the vinyl plastics replaced natural rubber and gave properties superior for some purposes. Shortly after the outbreak of the war, all of the limited supply of these materials was reserved for the use of the Army and Navy.

No standard specifications had been developed although there was a considerable background of service experience. The critical situation with respect to the supply of natural rubber now makes essential the fullest use of all available substitutes and with increased amounts of vinyl plastics becoming available through new plant construction, this material is being allocated more broadly for uses where it can replace rubber.

The new specifications for rubber and synthetic compounds for aeronautical and automotive applications cover vulcanized compounds of natural rubber, reclaimed rubber, synthetic rubber, or rubber-like materials, alone or in combination, which are intended for use in manufacturing various products. Compounds for tires, inner tubes, sponge rubber, and hard rubber are not included.

Although the individual compounds provide a wide variety and range of physical properties, the specifications are general and are intended to furnish a basis for engineers to select material suitable for common applications. These new specifications have been based on simplifications projects carried out in Technical Committee A on Automotive Rubber sponsored by the A.S.T.M. and S.A.E.

Committee D-11 also reviewed a number of phases of its work, including research work on low temperature which will include investigation of four types of tests, to cover (a) brittleness, (b) hardness and modulus, (c) loss of resilience and (d) fatigue and flexing.

Two papers presented at the A.S.T.M. meeting in Pittsburgh were of distinct interest to the rubber field, one describing the use of the durometer for measuring hardness of rubber, in which the author, R. H. Taylor, National Bureau of Standards, described extensive work and outlined a recommended procedure. Also, he reported that if the durometer readings were plotted against the logarithm of the time, straight line curves were obtained, the slopes of which may be taken as a measure of creep.

Another paper, by Irving L. Hopkins, Bell Telephone Laboratories, Inc., covered the relaxation of rubber-like materials in which a method was covered whereby each specimen is permanently fixed in its own test cell which can then be subjected to any desired conditions.

COMMITTEE AGREES UPON CARBON BLACK NOMENCLATURE

After a series of meetings, the special committee appointed by Dr. Norman A. Shepard of the Office of the Rubber Director has agreed upon standard nomenclature of carbon blacks. The committee, headed by Dr. W. B. Wiegand, director of research of the Columbian Carbon Co., who is also acting as a research consultant to the Office of the Rubber Director, recently submitted its findings to Dr. Shepard. The nomenclature agreed upon follows:

Name	*Symbol*
Conductive Channel	CC
Hard Processing Channel....	HPC
Medium Processing Channel..	MPC
Easy Processing Channel....	EPC
Conductive Furnace	CF
Fine Furnace	FF
High Modulus Furnace.....	HMF
Semi-Reinforcing Furnace ...	SRF
Fine Thermal	FT
Medium Thermal	MT

CARBON BLACK NOMENCLATURE

(Brand Names by Producers—As of June 14, 1943)

Symbol	*Cabot*	*Columbian*	*Continental*	*Huber*	*Johnson*	*United*	*Witco*
CC	.....	.....	Under Classification	.....	.....	.....	.....
HPC	Spheron #4	Micronex Mx II	Continental F	HX	.....	Kosmobile S	.....
MPC	Spheron #6	Std. Micronex	Continental A	TX	.....	Kosmobile	.....
EPC	Spheron #9	Micronex W-6	Continental AA	Wyex	.....	Kosmobile 77	.....

	Cabot	*Columbian*	*General Atlas*	*Huber*	*Phillips*	*United*
CF	.....	Statex A	.....	FB200	.....	(*)
FF	.....	Statex B	.....	.....	.....	.....
HMF	.....	Statex 93	.....	.....	Philblack	Kosmos 40
SRF	Sterling	Furnex	Gastex	Essex	.....	Kosmos 20

	Shell	*Thermatomic*
FT	.....	P-33
MT	Shell	Thermax

* To be announced later.

CAREFUL MAINTENANCE QUADRUPLES TIRE LIFE AT CAMP LEE, VIRGINIA

The Quartermaster Replacement Training Center at Camp Lee, Virginia, trains a large share of the Army's truck drivers, as well as mechanics, laundrymen, shoe repair men, and other supply technicians. This replacement center is the largest station of its kind in the country. The thousands of general and special purpose vehicles used in Quartermaster training get tough and hard treatment as the new soldiers learn their work.

Before August, 1941, when the Camp Lee entire maintenance shop was set up, these vehicles averaged 7,000 miles in tire life. Today the average tire on a truck or jeep turns in around 30,000 miles before it needs a new tread. This, according to Army tire maintenance men, is the equivalent of 50,000 miles on a commercially-driven tire, the free-rolling axles of commercial trucks being considerably easier on tires than the motor-driven axles of Army vehicles.

By stretching the life of tire treads from 7,000 to 30,000 miles, the tire shop at Camp Lee saves the Army the equivalent of a half-million dollars worth of rubber a year. That is, if the rubber could be bought. The fact is there is none available except for the government's dwindling stocks, and in effect the tire shop permits Camp Lee trucks and vehicles to roll to the extent of three extra sets of tires.

Program Carefully Executed

The secret of this record is able direction, and a carefully executed program of tire maintenance and repair carried out under the supervision of Lt. C. S. Schaevitz, in the operations section of the motor training division, under Lt. Col. John E. Mutty. Lt. Schaevitz, who is in charge of the tire shop, ran his own tire maintenance and recapping shop at Camden, New Jersey, before taking up the same work for the Army. His non-commissioned staff of ten have all had a decade or more of experience, some in their own shops and some in the shops of major rubber concerns.

The shop these men operate is, like most of the other training establishments at Camp Lee, a combined training and production organization. The truck driver trainees who carry out the tire inspection and repair learn tire maintenance first hand as part of their training, and at the same time service the tires of the driver-training vehicles of the motor training division and all other government vehicles at Camp Lee.

The tire shop is located convenient to the "black top," a huge macadam stretch many blocks in area, where drivers entering the initial stages of driver training, maneuver Army 6 x 6 trucks, and learn the fundamentals of truck operations. By the time the men sit at the wheels of these trucks and drive them to the air towers for servicing, they are aware of the importance of tire maintenance and intimately acquainted with the mechanics of tire and tube repair.

The air tower method of inflation and checking used by the tire shop is quick and sure, and permits the shop operators to handle an exceptionally large volume of work. The 21 air outlets surrounding the tire shop building are arranged to allow two men to work on each vehicle at the same time. A truck company of 51 trucks formerly required two hours to "air-up." By use of the air towers the job is now done in 40 minutes. With all the air towers in use, three companies comprising a total of 153 trucks can go through the inflation and checking process at the same time. This job has to be done quickly, since more than 25,000 tires are checked and inflated each week.

Checking of Tires Important

The checking of the tires by the shop personnel is probably the greatest single factor in the phenomenal increase of tire life the shop has accomplished. While the truck drivers inflate the tires, the shop personnel inspect them. They look first for unusual tread wear, which points usually to some mechanical trouble, such as misalignment, or unbalanced wheels. Nails, glass, and other foreign objects imbedded in the tread are removed. During the inspection the shop men also look for tires which are mismatched, or need to be rotated, repaired, or recapped. The non-commissioned officer in charge of inspection has the daily responsibility of calibrating all gauges, noticing any unusual loss of air in the tires, and replacing missing valve caps.

Vehicles "deadlined" for any of these reasons are routed into the shop, where attendants begin correction of the faults caught in inspection. The men who run the shop believe correction of even a small tire fault may save or greatly lengthen the life of a tire, and the number of tires changed, switched, or remounted in the shop is enormous, running to around 500 a week. While the shop is not equipped for recapping and cord repairs, all spot, valve, and tube injuries are repaired by soldier trainees, under the supervision of instructors.

In addition to maintaining a continuous cycle of inspection and repair, the shop staff conduct daily classes for the truck driver trainees. The men are taught to change a tire safely, swiftly, and efficiently, to repair and change seven different vehicle types of valves, and to repair any size of tube tear. All this is the practical half of a day of tire study. Mornings are spent in the classroom observing films and demonstrations of various types of tire maintenance and repair.

Schedule Pays Dividends

This schedule of training, and of maintenance and repair, pays big dividends. Army truck drivers, who tomorrow may be hauling United Nations cargoes along the scattered battle-fronts, are taught to be careful and resourceful in the matter of looking after the tires of their vehicles. By quadrupling the tire life of Camp Lee training vehicles at the same time, these men provide an important example of what good tire maintenance can do.

The soldier at the left is inspecting the interior of a tire while another trainee prepares a spot repair for curing in the spot-plate standing in the center. Constructed by the shop personnel from available scrap material, the spot-plate has been of assistance in repairing thousands of damaged truck tires. Soldier truck drivers trained in the Quartermaster Replacement Training Center at Camp Lee learn all types of valve and tube repairs, and to change truck tires swiftly, safely, and efficiently.

GOLF TOURNAMENT FEATURES THE BOSTON GROUP'S OUTING

A golf tournament held in the afternoon featured the regular summer meeting and outing of the Boston Group, Rubber Division, A.C.S., held at the Commonwealth Country Club, near Boston, on June 25. In addition to the tournament, the program included darts, archery, ping-pong and other outdoor sports. Card games were in session all day long. Approximately 260 members and guests were present at dinner. Although Walter H. Peterson, of the Office of the Rubber Director, was scheduled to deliver an address on "Conversion to Synthetics," the address was withdrawn and therefore no paper was given after the meeting.

A number of prizes were given to winners of various events in the golf tournament, who were as follows: *Kicker's Handicap*, R. Cowen (Quabaug Rubber), M. Wilner (Plymouth Rubber), and R. Edwards (Stedfast Rubber), first, second and third, respectively; *Low Gross*, J. A. Simpson, H. Odell (Odell Mfg.), and F. F. Salamon (Binney & Smith), first, second and third, respectively; *Nearest-to-Pin*, E. Colligan (Plymouth Rubber); *Low Net*, R. H. Heintz; *Most 8's*, J. Clarke (Hood Rubber); *Highest Score*, E. Covell (Stedfast Rubber). Ed Osberg (Wilmington Chemical) won top honors in the dart contest, while ping-pong honors went to T. Emery and T. Cushman. Prizes were made possible by donations received from the following companies:

List of Contributors

L. Albert & Son, American Cyanamid & Chemical Corp., American Zinc Sales Co., Inc., Anaconda Sales Co., Ansbacher-Siegle Corp., T. C. Ashley & Co., Atlantic Refining Co., Avon Sole Co., M. Barbanell, Inc., Barrett Co., B. B. Chemical Co., Binney & Smith Co., Godfrey L. Cabot, Inc., Callaway Mills, Carbide & Carbon Chemicals Corp., Carter Bell Mfg. Co., Cleveland Liner & Mfg. Co., Colonial Beacon Oil Co., Commercial Solvents Co., Continental Carbon Co., Converse Rubber Co., Deecy Products Co., E. F. Drew & Co., Inc., DuPont, Eagle-Picher Sales Co., William D. Eggleston Co., C. E. Gale Co., General Atlas Carbon, General Dyestuff Corp., General Latex & Chemical Corp., General Fibre Co., Givaudan-Delawanna, Inc., Haartz-Mason-Grower Co., Alfred Hale Rubber Co., Hercules Powder Co., Hird & Connor, Inc., Hodgman Rubber Co., Hood Rubber Co., J. M. Huber, Inc., Ralph B. Huber, Hycar Chemical Co., *India Rubber World*, Innis, Speiden & Co., Imperial Paper & Color Corp., Ernest Jacoby & Co., D. H. Litter Co., Malrex Chemical Co., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co.

New Jersey Zinc Co., A. C. Nispel, Inc., Oakite Products, Inc., O'Dell Coated Fabric Co., Panther-Panco Rubber Co., Pequanoc Rubber Co., Philipp Brothers, Inc., Pittsburgh Plate Glass Co., Plymouth Rubber Co., Raffi & Swanson, Inc., Respro, Inc., Rex-Hide, Inc., John Royle & Sons, RUBBER AGE, Sanford Mills, A. Schrader's Son, A. Schulman, Inc., Henry L. Scott Co., Sessions-Gifford Co., Sherwin-Williams Co., Socony-Vacuum Oil Co., Stamford Rubber Supply Co., Stanco Distributors, Standard Chemical Co., Standard Lime & Stone Co., Standard Ultramarine Co., Stanley Chemical Co., Stowe-Woodward, Inc., Sun Oil Co., Taylor Instrument Cos., Texas Co., Thiokol Corp., Thompson Weinman Co., Titanium Pigment Co., Wm. R. Thropp & Sons Co., Turner-Halsey Co., Tyer Rubber Co., Union Bay State Co., R. T. Vanderbilt Co., Vansul & Co., Weller Chemical Co., Wesco Waterpaints, Inc., L. G. Whittemore, Inc., Wilmington Chemical Corp., Charles T. Wilson Co., Inc., N. S. Wilson & Sons, Windsor Manufacturing Corp., Wishnick-Tumpeer, Inc., Xylos Rubber Co.

Coming Events

July 24-25. Los Angeles Rubber Group, Annual Outing, Uplifter's Club, Los Angeles, Calif.

Aug. 8. Northern California Rubber Group, First Outing, Old Hearst Ranch, near Dublin, California.

Aug. 14. Chicago Rubber Group, Annual Outing, Nordic Hills Country Club, Chicago, Ill.

Sept. 6-10. American Chemical Society, 106th Meeting, Pittsburgh, Penna.

Sept. 16. Buffalo Rubber Group, Hotel Westbrook, Buffalo, N. Y.

Oct. 5-7. Rubber Division, A.C.S., Fall Meeting, Hotel Commodore, New York, N. Y.

Oct. 5-7. National Safety Council, Sherman, LaSalle and Morrison Hotels, Chicago, Ill.

Dec. 6-11. 19th Exposition of Chemical Industries, Madison Square Garden, New York City.

Plans for California Outing

Plans for the first annual outing of the Northern California Rubber Group have been announced. The outing will be held at the Old Hearst Ranch (Route 50 to Dublin and turn right five miles) on Sunday, August 8. The ranch offers one of the finest golf courses in California, swimming pool, tennis courts, ping pong, billiards, baseball, and other sports facilities. Members are invited to bring along their families, the charges being $2.50 for adults and $1.65 for children under ten years of age. This includes a Dude Ranch Dinner. Prizes for winners of various contests and for lucky number holders will be provided.

RHODE ISLAND CLUB HOLDS REGULAR SUMMER MEETING

The Rhode Island Rubber Club held its regular summer meeting at the Metacomet Golf Club in East Providence, R. I., on June 18. A golf tournament preceded the dinner, at which approximately 75 members and guests were present. Prizes were awarded to winners of various events in the golf tournament, in addition to which some door prizes were distributed. Winners in the tournament included the following: *Low Net*, Ray Newell (Respro); *Low Gross*, A. Perry (Krebs Pigment); *2nd Low Gross*, F. F. Salamon (Binney & Smith); *High Gross*, L. K. Morrow (Anaconda Wire).

During the meeting, an open forum was held on synthetic rubber. E. L. Hanna (Davol Rubber) presided, and contributions to the forum were made by Joseph Breckley (Titanium Pigment), A. J. Puschin (Thiokol), Bruce Silver (N. J. Zinc), and Ed Osberg (Wilmington Chemical). Additional comments were made by others present at the meeting.

After dinner, C. Foster Fenner, a professional, entertained with feats of legerdemain. Prizes for the golf tournament and the door prizes were made possible by contributions received from the following companies:

American Cyanamid & Chemical Corp., Anaconda Sales Co., Binney & Smith Co., Godfrey L. Cabot, Inc., Carbro Chemical Co., Cleveland Liner & Mfg. Co., Continental Carbon Co., Du Pont, Wm. D. Egleston Co., Imperial Paper & Color Corp., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co., Naugatuck Chemical, N. J. Zinc Sales Co., Pequanoc Rubber Co., A. Schulman, Inc., Henry L. Scott Co., Solar Compounds, Standard Chemical Co., Taylor Instrument Cos., Thiokol Corp., Titanium Pigment Corp., R. T. Vanderbilt Co., Weller Chemical Co., Wilmington Chemical Co., Wishnick-Tumpeer, Inc., L. G. Whittemore Co., Xylos Rubber Co.

Polymel—New Compounding Aid

Polymel, a new compounding aid, which is said to have indicated unusual characteristics as a plasticizer, softener, extender and general processing material in GR-S, Hycar, Chemigum, and other synthetic rubber stocks, as well as in reclaim stocks, was recently developed by the Maryland Colloid Co., 717 W. North Ave., Baltimore, Maryland. In every test, according to C. G. LaCrosse, president of the firm, which specializes in industrial research, at least 20% increase in tensile and 10% increase in elongation was observed, with no change in heat build-up. Polymel is also reported to lend considerable resistance to oil, gasoline, kerosene, etc. All tests made used 25 parts of Polymel and 75 parts of GR-S, Hycar or Chemigum. Pilot plant production is now in progress on the new material, with commercial production anticipated shortly.

NEWS IN BRIEF

A new type plastic insole for jungle boots, which keeps the foot dryer and at the same time may be easily sterilized by washing with soap and water, has been developed by the Quartermaster Corps. It is made up of five layers of plastic screening, four of which are coarse mesh and the other one fine. This composition is said to permit a maximum of ventilation between the foot and the rubber sole of the boot.

C. R. Lebo, a music teacher in the Akron, Ohio, public school system, is reported to have developed a unique method of weaving Pliofilm into fabric used for shoes, purses, instrument strings, and other articles. The production of a thin string for the manufacture of dresses and stockings of Pliofilm is anticipated.

Conductive rubber heels, built with brass washers instead of the conventional steel in order to provide better adhesion with the rubber, are now being produced at the Windsor, Vermont, plant of the Goodyear Tire & Rubber Co. At present, distribution is largely confined to munitions makers.

The publication of a handy chart which gives at a glance the equivalent of fractions in four-point decimals has been announced by the Mechanical Goods Division of U. S. Rubber Co. Copies are free to engineers and manufacturers. Address 1230 Sixth Avenue, New York City.

The latest general booklet to be distributed by the General Atlas Carbon Division of General Properties Co., Inc., Pampa, Texas, is one on the "A-B-C of Wartime Canning."

An interesting chart outlining the properties of various materials used in coating or impregnating felt has been made available by the Automotive Rubber Co., 8601 Epworth Boulevard, Detroit, Mich. Materials covered include latex, neoprene, Thiokol, reclaimed rubber, polyvinyl chloride, and Agripol.

Expanding its use of Pliofilm to airplane engine "spares" in addition to its current use on new engines, the U. S. Army Air Force is said to have placed the largest order ever received for this transparent moisture-proof wrapping material with Goodyear.

A new booklet under the title of "Spreading the Work," designed to assist prime contractors and subcontractors in problems arising out of their relationships with the procurement services, has been issued by the Smaller War Plants Corp., Washington, D. C.

The Lancaster Process of reclaiming rubber, which utilizes a Banbury in the process, is reported to have been put into commercial operation at the Indianapolis, Indiana, plant of the Richardson Co. The new process is said to be ideally suited for handling synthetic scrap.

According to report, Civilian Defense Director Landis has 5,000,000 gas masks on order, with approximately 1,000,000 already delivered.

Sale of Auto-Lite automotive replacement wire and cable has been transferred from the company's Wire Division at Port Huron, Mich., to the Merchandising Division, located at Toledo, Ohio. F. A. Nealon, sales manager of the Merchandising Division, will direct sales and promotion.

The speech presented by John L. Collyer, president of the B. F. Goodrich Co., before the Chamber of Commerce of the State of New York in New York City on June 3 has been made available in booklet form by the company. Ask for "Rubber in War and Peace."

A group life insurance policy involving a total of $118,500 has recently been acquired by the Goodall Rubber Co., Inc., Trenton, N. J., for the protection of 79 employees. Each worker receives a life insurance of $1,500, the company assuming the entire premium expense. The policy was issued by the Prudential Insurance Co. of America.

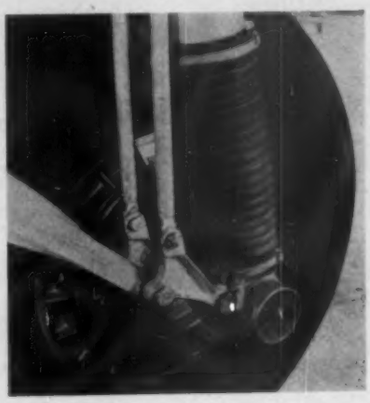
Plans to enter the manufacture of rayon tire cords have been announced by the Bibb Manufacturing Co., developers of the well-known Heat-Resistant Cotton Cord, of Macon, Georgia. WPB is reported to have approved the company's program for the installation of twisters and weaving equipment necessary for the production of the new type cord.

Synflex FT-22, a versatile, rubber-like synthetic for electrical insulation and other non-electrical applications, and Synflex FT-11, a transparent, flexible tubing developed for extreme sub-zero applications, with an unusually wide range of working temperatures for continuous operation, have been announced by the Industrial Synthetics Corp., Irvington, N. J. Data sheets are available from the company.

A "Truck Battery Guide," which provides full information on battery purchases and care to the truck operators of the nation, has been issued by U. S. Rubber. It is termed a "ready reference guide to battery problems."

Protects Vital Plane Parts

One of the new devices designed to protect the delicate mechanisms of American fighting and other type planes from desert dust and other foreign matter, in



which synthetic rubber is utilized, is a boot to protect hydraulic and all other similar equipment having limited space, such as landing gear actuating mechanisms, bomb bay doors, and other mechanically moving parts. The boot, illustrated herewith, is made of lightweight fabric construction and is coated with synthetic rubber. Manufactured by the U. S. Rubber Co., this boot will become an integral part of many new planes now being built.

Copper mesh coated with synthetic rubber, originated by the Detroit Gasket & Manufacturing Co. and produced by the Goodyear Tire & Rubber Co., is said to be the biggest advance in gasket material since the development of the internal combustion engine. The rubber-sheathed mesh is reported to have survived exhaustive tests and now is standard equipment for many airplane engines produced in this country.

Ownership of the building formerly occupied by the Mason Tire & Rubber Co. in Kent, Ohio, has been acquired by the C. L. Gougler Machine Co. The sale price was reported to be about $125,000.

Installation of a new "live steam barge vulcanizer" is reported to have stepped up the vulcanization speed on inflatable rubber barges for tending U. S. Navy patrol planes from a rate of one every 3 hours to one every 50 minutes at one of the Goodrich plants in Akron. The new vulcanizer has an inside diameter of 10 feet, 6 inches, is 42 feet long, and weighs 35 tons.

A new tool for loosening airplane tire beads from the rims has been perfected by Firestone. It is provided in a kit only 38 x 6 x 6½ inches, weighing only 48 pounds. The kit contains enough equipment to carry through the work of demounting a tire and mounting it again. The tool is reported to have been tested by the Army Air Force.

RUBBER DIVISION, A.C.S., TO HOLD THREE-DAY MEETING

The Division of Rubber Chemistry, A.C.S., which as previously announced will hold its Fall Meeting in New York City instead of convening with the parent society for its 106th meeting in Pittsburgh in September, will hold a three-day meeting on Tuesday, Wednesday and Thursday, October 5, 6 and 7. Headquarters will be maintained at the Hotel Commodore and all technical sessions will be held in that hotel. The program has been deliberately scheduled over three days in order that there will be ample time for full discussion of papers, for the usual "corridor" sessions, and for visiting.

Papers Are Invited

All members of the Division are urged to participate in the varied program of the coming meeting by presenting a paper on any phase of rubber science and technology. It is pointed out that the lid of censorship is being lifted slowly from certain phases of the synthetic rubber development, particularly in respect to compounding and processing, and papers covering new developments in this field will be particularly welcome.

As usual, papers must be submitted to the secretary of the Division, Dr. H. I. Cramer, c/o Sharples Chemicals, Inc., 23rd and Westmoreland Streets, Philadelphia. The deadline for receipt of abstracts of 200 to 250 words, in triplicate, is August 25. Since all papers dealing with synthetic rubber must be approved by Washington, manuscripts on this subject, also in triplicate, must be in the hands of the secretary by September 15. The rule of the American Chemical Society that at least one author of any paper must be a member of the society applies to papers for the Division meeting.

Banquet to be Held

The divisional banquet will be held in the Hotel Commodore on Wednesday evening, October 6. Because of the critical food situation, the committee in charge of arrangements, headed by E. B. Curtis of the R. T. Vanderbilt Co., urges that tickets be purchased and reservations made just as early as possible. It is also suggested that hotel reservations be made at the Commodore early. Those reservations which the Commodore cannot take care of will be referred to the nearby Biltmore, Lexington, Roosevelt and Waldorf hotels. Transportation arrangements as well should also be made early.

The treasurer of the division is desirous of obtaining copies of the January, 1941, and April, 1941, issues of *Rubber Chemistry & Technology*, and is offering $2.50 for each copy of these numbers turned in. They should be mailed to C. W. Christensen, c/o Monsanto Chemical Co., 1012 Second National Building, Akron, Ohio.

DuPont Shows Coated Fabrics

Some of the hundreds of military products fabricated of synthetic resin-coated and synthetic rubber-coated fabrics produced by the "Fabrikoid" Division of E. I. du Pont de Nemours & Co., Inc., were shown to a group of newspaper and magazine writers at the headquarters of the division in the Empire State Building in New York City on July 9. C. A. Alt, head of the division's war product development, furnished interesting details concerning the manufacture and application of the miscellaneous fabrics, which are used in the manufacture of raincoats, tents, sleeping bags, jungle hammocks, ponchos, life-raft covers, first-aid kits, and hospital sheeting among other military uses.

New Synthetic Wax

Monty Wax No. 3, an alternate for Montan wax, has been developed and introduced by Wishnick-Tumpeer, Inc., New York and Chicago. The new wax-like material is very hard, dark brown in color, and is compatible with most other waxes and thermoplastic resins. It has a melting point of 154° F., an iodine value between 18 and 19, saponification value of 47 to 49, and acetyl value of 44 to 46.

Atwood Controls Atlantic Firm

Ownership and control of Atlantic Research Associates, Inc., Newtonville, Mass., recently passed from the National Dairy Products Corp. to F. C. Atwood who, in turn, has resigned his connections with Aralac, Inc., and the Aralac Corporation. Atlantic Research Associates, Inc., thus returns to its original status as an independent research and development organization. During the past year this organization has devoted itself almost exclusively to synthetic rubber research, and has developed synthetic latex and cements comparable with those of natural rubber. Most of this development has been in the field of chemurgic rubber.

Form Laurie Reclaiming Co.

The Laurie Rubber Reclaiming Co., a partnership, was recently organized and has leased from the Somerset Rubber Reclaiming Works, New Brunswick, N. J., all of the buildings and machinery of that company. Somerset, of which Irving Laurie is president, discontinued the manufacture of reclaimed rubber and allied products as of June 30, but retains full ownership of the plant and equipment. All unfilled orders have been assumed by the newly-organized Laurie Rubber Reclaiming Co.

GOODYEAR DEVICE USES SOUND WAVES TO DETECT DEFECTS IN AUTOMOBILE TIRES

Supersonic vibrations, or sound waves, beyond reach of the human ear, are used to detect defects in automobile tires in a new device perfected by the Goodyear Tire & Rubber Co. The tire is hung on two rollers so that as the bottom portion of it passes through a shallow tank of water sound waves of supersonic frequency are generated. If there is no separation in the tire, a green light indicator stays green and the tire can be retreaded. If the tire is defective the light turns red. This simple test prevents recapping of tires which are not suitable. The photo shows Dr. W. E. Morris of the Goodyear laboratory staff.

Who's Who in Washington—and Where

(As of July 14, 1943—Compiled by the Staff of RUBBER AGE)

OFFICE OF THE RUBBER DIRECTOR

New Municipal Building, 4th and D Sts., N.W., Washington, D. C.

Rubber Director—William Martin Jeffers.
Deputy Rubber Director—Col. Bradley Dewey.
Assistants—Morehead Patterson and Stanley Osborn.
Assistant Deputy Rubber Directors—L. D. Tompkins (Operations), Frank R. Creedon (Plant Construction), E. B. Babcock (Technology and Specifications), E. R. Gilliland (Research and Development of Synthetics).
Administrative Officer—Frank P. Downey, Jr.
Head, Education Program—Dr. H. E. Simmons, assisted by J. M. Ball (Editorial), E. B. Busenberg (Reclaim), D. F. Fraser (Neoprene), C. W. Sanderson (Thiokol), A. H. Nellen (Tires and Tubes), R. F. Wolf (Butyl), Arthur Nolan (Latex and Dispersions), and M. N. Harocopo (Statistics).
Manager, Priorities and Materials Control—S. P. Dorsey.
Manager, Allocations—George B. Kayser.
Head, Product Specifications—C. S. Reynolds, assisted by V. R. Grainger, Walter Juve (Wire and Cable, etc.), R. C. Dabney (Tape, Proofed Fabrics, etc.), R. J. Hull (Tires and Tubes, etc.), S. C. Compher (Tire Retreading), and Addis Finney (Revision of Specifications).
Head, Natural Rubber—Atherton Lee.
Manager, Requirements and Capacities—James H. Higgins.
Supervisor, Mechanical Goods—J. E. Skane.
Research Associates—A. E. Boss, R. A. Crawford, D. A. Cutler, J. C. Elgin, Harry L. Fisher, C. S. Fuller, P. S. Greer, George Haslam, L. J. D. Healy, J. E. Hutchman, R. W. Kixmiller, G. Lyons, M. Ren Paul, C. W. Perry, C. F. Prutton, Norman A. Shepard, J. E. Troyan, P. H. Watkins, W. B. Wiegand, and R. R. Williams.

RUBBER DEVELOPMENT CORPORATION

1626 K St., N.W., Washington, D. C.

Chairman of the Board—W. L. Clayton.
President—Douglas H. Allen.
Assistants—R. B. Bogardus, James C. Roberts, and R. O. Case.
Vice-Presidents—John W. Bicknell, Reed Chambers, S. M. MacAshan, Paul B. Mckee, and Wm. E. Mitchell.
Assistants—Curtis E. Anderson, and Harry Shere.
Treasurer—W. C. Beck, Jr., and Frank Farrington.
Budget Office—Don C. Carnes and Wm. J. McNamee.
Head Field Technician—C. B. Manifold.
Associates—Earl M. Blair and W. A. Stanton.
Regional Administration—
Brazil—R. B. Bogardus.
Bolivia, Peru—James C. Roberts and Walter A. Graham.
Other South America—Bernard B. Carlin and E. W. Mills.
Central America and Mexico—Harland J. Corson and Robert M. Hutchins.
Plantations—M. D. Knapp and Valentine O. Goodell.
Supplies Procurement—E. B. Murphy and Norman D. McDonald.
Priorities and Export Regulations—Roland H. Rife.
Rubber Purchasing—L. B. Proctor and George Pell.
Rubber Products Distribution—Richard Cooke and Harry A. Carragher.
Commercial Research—Everett G. Holt and Joshua F. Dunbar.
Aviation Division—Ford Studebaker.
Traffic—A. J. Gariepy.
Communications—Everard Stuhrman.
Marine Division—Wm. E. Flanagan.
Personnel—Charles B. Rollins and John C. Lang.

Note: Supplies Procurement Office in H.O.L.C. Building, 1st and Indiana Ave., N.W., Washington, D. C.

RUBBER RESERVE COMPANY

811 Vermont Ave., N.W., Washington, D. C.

Chairman of the Board—Jesse H. Jones.
President—Howard J. Klossner.
Special Assistant—China R. Clarke.
Vice-Presidents—R. D. Young, Henry A. Mulligan, Stanley T. Crossland and John W. Livingston.
Secretary—George H. Hubert.
Treasurer—W. C. Beck, Jr.
General Counsel—H. Clay Johnson.
Consultant—A. L. Viles.
Scrap Rubber—W. J. McCauley.
Latex—Richard Baybutt.
Sales—H. C. Bugbee.
Chief, Administration Division—W. H. Sullivan.

OFFICE OF PRICE ADMINISTRATION

Third and Independence Ave., N.W., Washington, D. C.

Rubber Price Branch

Price Executive—Lester V. Chandler.
Chief Counsel—John N. Cole.
Head, Raw Materials and Financial Section—George W. Bolton.
Head, Tire Price Section—Robert V. Mitchell.
Head, Other Rubber Products Section—Everett D. Hawkins.
Head, Rubber Section, Accounting Division—John S. Bartlett.
Head, Rubber Section, Standards Division—T. M. Miller.
Head, Special Projects Section—Kenneth E. Lawton.
Administrative Officer—Arthur F. Schalk, Jr.

Automotive Supply Rationing Division

Director—Charles F. Phillips.
Legal Counsel—David L. Lloyd.
Head, Field Section—H. C. Burkiewicz.
Assistants—J. W. Bonbrest (Tires) and H. F. McGrath (gasoline).
Administrative Officer—John B. Annett.
Chief, Tire Rationing Branch—S. E. Bonnett.
Assistant—James Leavey.
Heads, Tire Rationing Branch—R. G. Leeth (Eligibility Section), A. Koehler (Tire Industry Section), A. G. Richtmyer (Research Section), L. A. Brown (Tire Inspection Section), and Frank Dougall (Quota Section).

GUAYULE EMERGENCY RUBBER PROJECT

315 West 9th Street, Los Angeles, California

Assistant Chief, Forest Service—C. M. Granger.*
Executive Officer—G. R. Salmond.*
Acting Director—Paul H. Roberts.
Assistant Director—E. L. Perry.
Chiefs—L. C. Stockdale (Business Management), J. R. Nelson (Personnel and Labor), John L. Emerson (Nursery Management), Henry L. Lobenstein (Plantation Management), Dr. W. G. McGinnies (Surveys and Investigations), James J. Byrne (Engineering and Mill Operation).
Director of Research—Dr. A. C. Hildreth.
Assistants—Dr. LeRoy Powers (Plant Breeding), Dr. Hamilton P. Traub (Plant Physiology), Dr. William A. Campbell (Pathology), Delmar C. Tingey (Agronomy), Dr. Omar J. Kelley (Soils), Raiford L. Holmes (Rubber Analyses), Harold W. Reynolds (Indicator Plots), S. W. McBirney (Agricultural Machinery).
Entomology—T. P. Cassidy.

Note: Most of the personnel listed above are members of the Forest Service, while others are officially members of the Bureau of Plant Industry. They are all located at the Los Angeles address, except those indicated by an asterisk, the latter being located at the Department of Agriculture in Washington, D. C.

NAMES IN THE NEWS

CHARLES BITTAKER, associated with the General Tire & Rubber Co. for the past 26 years, has been advanced from tire room superintendent to production superintendent. Before joining General Tire in 1917, he served with Goodrich and the old Diamond Rubber Co.

R. D. HAGER, who has been serving as manager of the Lone Star Defense Corp., a B. F. Goodrich Co. subsidiary in Texas, has been appointed production superintendent of the parent company's industrial products division at Akron. He is succeeded as general manager of the Lone Star plant by JOSEPH C. HERBERT, one-time assistant secretary of the company.

DR. JOHN J. GREBE, director of the physical research laboratory of the Dow Chemical Co., Midland, Mich., has been elected to receive the Chemical Industry Medal for 1943. The award is presented annually for valuable application of chemical research to industry by the American Section of the Society of Chemical Industry.

DR. ROBERT F. RUTHRUFF, associated with the Sherwin-Williams Co. since 1939, has been appointed director of research for that company and its various subsidiaries. Prior to his new appointment he was in charge of oil research for the company.

DR. HUGH M. HUFFMAN, formerly connected with the California Institute of Technology, Pasadena, Calif., has been appointed to direct the operations of a new laboratory at the Petroleum Experiment Station maintained by the Bureau of Mines in Bartlesville, Oklahoma. A study of the possibilities of direct conversion of butane to butadiene will be the initial project of the new laboratory.

GEORGE C. CRABTREE, associated with the U. S. Rubber Co. since 1922, has been appointed manager of belting sales for that company. He is a graduate of Cornell University, class of '16, holding a degree of mechanical engineering.

JAMES E. TRAINER, vice-president in charge of production of the Firestone Tire & Rubber Co., Akron, has been elected a fellow of the American Society of Mechanical Engineers for his "distinct engineering achievements." Less than 300 mechanical engineers in this country have been similarly honored.

NORMAN O. AEBY, purchasing agent of the Johns-Manville Corp., was elected president of the Purchasing Agents Association of New York at its annual meeting held in New York City on June 15.

E. L. FEININGER, associated with the General Electric Co. for the past several years, has been named manager of the new Resin and Insulation Material Division of the Appliance and Merchandising Department. He will maintain headquarters at the Schenectady, N. Y., plant.

L. K. YOUSE, formerly associated with the Firestone Rubber & Latex Products Co., and more recently with the Kleistone Rubber Co., has joined the L. H. Gilmer Co., Philadelphia, as chief chemist.

CHARLES BERLOW, for many years technical superintendent of the American Wringer Co., Woonsocket, R. I., leaving that concern a few months ago, has joined the Boston Woven Hose & Rubber Co., Cambridge, Mass., as a research chemist.

DR. E. R. WEIDLEIN, director of the Mellon Institute, and DR. ERNST A. HAUSER, associate professor of chemical engineering at M.I.T., have been named members of the Advisory Board to the Research and Development Branch of the Military Planning Division of the Office of the Quartermaster General.

C. N. SUFFILL, associated with the Lincoln Aeronautical Institute for the past six years, and prior to that associated with the U. S. Rubber Co. for 11 years as sales promotion manager of the tire division, has rejoined U. S. Rubber as head of the business development department of the Fisk Tire division.

ERIC MACFAYDEN, a director of Harrisons & Crosfield, Ltd., of London, England, widely known in rubber cultivating circles, was recently knighted by the King for services to agriculture in the Colonial Empire.

E. M. IKERT, assistant treasurer of the Republic Rubber Division of Lee Tire & Rubber Co., Youngstown, Ohio, was elected president of the Youngstown Club at a meeting of trustees of the club held in Youngstown on June 22.

IRVING MERDINGER, formerly associated with the U. S. Rubber Co., has joined the technical staff of Foster D. Snell, Inc., Brooklyn, N. Y. Other recent additions to the staff include MADLYN M. SHELDRICK, ASHER WOLLISON, and AGATINA CARBONARO, the latter formerly with the Arabol Manufacturing Co.

DR. GEORGE GOLDFINGER, formerly associated with the laboratory maintained at the Brooklyn Polytechnic Institute under PROF. H. MARK, where he worked on high polymers, has joined the research staff of Godfrey L. Cabot, Inc., Boston.

Dinsmore Made Vice-President

Dr. R. P. Dinsmore

Dr. R. P. Dinsmore, development manager of the Goodyear Tire & Rubber Co. since 1939, and associated with that company since his graduation from Massachusetts Institute of Technology in 1914, has been elected vice-president in charge of research and development of the company. The election was announced during the dedication of Goodyear's new research laboratory in Akron last month. Joining Goodyear on technical service and compounding, Dr. Dinsmore went to the Bowmanville, Canada, plant in 1916 as a compounder, became assistant chief chemist at New Toronto in 1917, later served as chief chemist at the California plant, and returned to Akron in 1921 as assistant development manager and chief chemist. Assigned to the development of new products with the title of assistant to the factory manager in 1932, he directed the research that resulted in Pliofilm, among other products, and was made development manager in 1939. The Case School of Applied Science, Cleveland, gave him an honorary degree of doctor of engineering in 1940.

LEE B. GREEN, former manager of the Firestone Rubber & Metal Products Co., Wyandotte, Mich., has been appointed executive vice-president and general manager of Designers for Industry, Inc., of Cleveland.

M. MALLARD, until recently connected with the Hycar Chemical Co., has been named chief chemist of the Williamstown, Mass., plant of the Cornish Wire Co., replacing ARMAND SEQUEIRA.

GEORGE O'KEEFFE, a member of the sales department of Proctor & Schwartz, Inc., Philadelphia, Penna., has been appointed sales manager of that company's dryer division. He is a graduate of the Stevens Institute of Technology.

LOS ANGELES NEWS

By July 7 nearly 100 members and guests had signed up to attend the Second Annual Outing of the Los Angeles Rubber Group, slated to be held at the Uplifters' Club on July 24 and 25. Reservations were still coming in.

A big attraction slated was the appearance of Joe E. Brown, movie star, who was to talk about his trip through the South Pacific where he spent several weeks entertaining the men in the armed service.

More than fifty prizes had been procured to be awarded in the various competitions scheduled on the program of the two-day outing. MacNeel Pierce, of Plastic and Rubber Products, did a good job as head of the prize committee. The various members of the program and arrangement committees also were especially active remembering the fine time that was had by all last year.

Arrangements have been made for photographs of the events and it is hoped that a grouping of these may appear in the August issue of RUBBER AGE.

The Southwestern Rubber Company has taken over additional warehouse space, 60 by 100 feet, as storage space for raw materials. The chief product of this company is camelback. Frank Keith is manager.

C. G. Harbaugh, formerly with the Keystone Tool and Supply Company, Los Angeles, also formerly operating manager in the Goodrich plant, is now purchasing agent for the Grizzly Manufacturing Company, 637 S. Clarence Street.

Bill Haney and Gaelen K. Norton, of the Kirkhill Rubber Company, were among Los Angeles rubber men who enjoyed June vacations.

The Santa Fe Rubber Mills, put out of business temporarily a few months ago by the destruction of its plant by fire, has re-opened in a much larger way in a new location. A building has been secured at 4010 Whiteside Street. Most of the machinery was salvaged after the fire in the old plant but a considerable stock of rubber was lost. The new factory was under partial operations as early as June 15. Between 20,000 and 30,000 square feet of floor space is being utilized. H. R. Minkoff is president, A. Castaneda is vice-president, and Harry D. Prouse is general manager.

With the completion of a new building which adds greatly to factory and office space, the W. J. Voit Rubber Corporation has achieved a rather complete re-arrangement of office space and modernization of office interiors.

Howard Lien, who leased his Atlas Sponge Rubber Company plant to the Kirkhill Rubber Company a year ago and who returned to his farm in Minnesota for a number of months, found the weather a bit cooler in winter up there than he had remembered it as being so he is now back in Los Angeles and holding down a job in a defense plant.

Following the departure of A. D. Nast, Jr., on June 20, the official personnel at Western Insulated Wire, Inc., has been re-arranged. Mr. Nast, president of the corporation, is on his way to England where he will act as assistant executive for the American Red Cross. E. H. Lewis, formerly vice-president and secretary, now becomes executive vice-president, secretary, and treasurer. S. F. Beatie, for the last sixteen years vice-president in charge of West Coast operations for the C.I.T. Corporation, and formerly also with the Johns-Manville Company, is the new vice-president. Harry Fain, who was plant manager, becomes superintendent, while Dr. D. Sutton succeeds Mr. Fain.

Mr. Lewis spent two weeks of June in New York and Washington, while Herman Libkind was also in the East for a while in June attending a meeting with the W.P.B. in Wilmington, Delaware, where synthetic rubber compounds was the theme under consideration.

Bill VonderReith, of the Sierra Rubber Company, is the proud father of John William VonderReith, who weighed into the mundane ring on June 7, at 6 lbs., 9 ounces.

The Northern California Rubber Group, of which Herman Jordan is president, is planning a one-day outing somewhere in the vicinity of San Francisco on August 8. Definite plans had not been reported at this writing.

H. H. Vickrey, secretary of the West American Rubber Company, now a lieutenant-colonel in the army, is stationed at Boulder Dam in charge of troops protecting that great edifice.

Claude Kelly, active in the Los Angeles Rubber Group, has recently been awarded his 25-year service pin by the Goodyear Tire and Rubber Company. Mr. Kelly has spent most of that time at the main Los Angeles plant but recently he was transferred to the new Goodyear synthetic rubber plant at Torrance (Los Angeles suburb), where he is in charge of accounts payable.

New Ski-Mountain Boot

A new type of ski-mountain boot suitable for use on either skis or in mountain climbing has been developed by the Quartermaster Corps to replace two types of ski-mountain boots now in use by American soldiers, the war Department reports. The new boot is equipped with a Bramani-type sole of one piece of rubber with rubber cleats molded into the sole and forming an integral part of it. This type of sole was developed in Europe a number of years ago for mountain climbing purposes in the Alps. The heel of the new boot, also of rubber, likewise has rubber cleats molded into it. The new type boot with Bramani soles is expected to be superior to the present leather soled boot with Tricouni climbing nails attached for mountain climbing, in that it will be more resilient, less noisy and can also be used more conveniently and effectively on skis when necessary.

Offers West Coast Facilities

The Hycar Chemical Co., Akron, has established west coast warehouse facilities at 1248 Wholesale Street in Los Angeles, California. The move to establish such facilities was undertaken to expedite delivery of Hycar to west coast users, particularly in the aeronautical industry. The Pacific Coast territory was recently assigned to D. C. Mady, who formerly covered the middle western area, who will have headquarters in Los Angeles. R. E. Bitter, who will make his headquarters in Akron, is now covering the middle western territory.

FINANCIAL NEWS

Firestone Tire & Rubber Co.

Six Months Ended April 30: Net profit of $6,387,797, after deductions for depreciation, interest, and Federal taxes, including $9,709,438 excess profits taxes, and after provision of $2,000,000 for contingencies and an estimated amount for possible adjustments resulting from renegotiation of war contracts, which is equal to $2.60 a common share. This compares with $5,193,024, or $1.97 a share, in the corresponding period of the previous year.

O'Sullivan Rubber Co.

For 1942: Net income of $143,478, equal to $1.18 each on 100,000 shares, which compares with a net income of $174,807 reported for the previous year.

Anaconda Wire & Cable Co.

First Quarter: Net profit of $280,928, equal to 67 cents a share, which compares with $548,235, or $1.30 a share, reported for the first quarter of the previous year.

CANADIAN NEWS

The synthetic rubber plant of the Polymer Corporation at Sarnia was visited during the month of June by William M. Jeffers, United States Rubber Director, during his tour of all synthetic plants on the continent. He was welcomed at the plant by R. C. Berkinshaw, president of the Corporation; W. R. Campbell, head of Ford Motor of Canada and a director of the synthetic rubber company; J. R. Nicholson, managing director of the Corporation; and J. W. Gemmel, manager.

Later, Mr. Jeffers went to Thorold, Ontario, to visit the plant erected by the Ontario Paper Company to produce industrial alcohol from the waste liquor resulting from production of sulphite pulp. Annual output of the plant is expected to be about 600,000 gallons, most of which will be exported to the United States. Speaking over a Canadian Broadcasting Company hook-up during the visit, Mr. Jeffers said that before the war is over American industry "will be producing synthetic rubber as cheaply and as good as any natural rubber."

Speaking recently before the House of Commons, Hon. C. D. Howe, Minister of Munitions and Supply, revealed that the Dominion is about to reap the first fruit of the $45,000,000 invested in the Polymer Corporation.

Ethylene and styrene units are scheduled to start operation in August. Polymerization facilities will also be completed and are expected to be turning out Buna S at 25 per cent of the plant capacity by the end of the month if the necessary butadiene is received from the United States. Polymer Corporation's own butadiene production equipment is not yet completed. The first 15,000-ton unit is expected to be finished in September and the second in October. Production of butyl rubber is also scheduled to start late in August or early in September.

When running at capacity the Polymer Corporation plants at Sarnia will fill all of Canada's war requirements for rubber but will not meet all of the civilian needs too. Mr. Howe stated that no expansion over present capacity is planned and that it is expected that operation of the plant will continue in peace time.

The Minister discussed in detail the reasons why the Dominion had decided to make its synthetic rubber from petroleum rather than from alcohol. The Sarnia butadiene plant is designed for conversion to alcohol if that should become desirable. It was estimated that the price of grain would have to be no more than 25 to 30 cents a bushel, however, before diolefin from this source could compete with that made from petroleum. Production from the latter source can be obtained without "materially detracting from our normal gasoline requirements," the Minister said.

Three reasons were given by Hr. Howe for construction of the Polymer Corporation plants adjacent to the Imperial Oil Company refinery at Sarnia. The location next to one of the largest refineries in the Dominion is only a relatively short distance from Canadian tire plants that will consume about 85 per cent of the product; by extending Imperial's cracking facilities the desired quantities of ethylene, butylene and isobutylene can be obtained at relatively low cost; and raw materials can be transferred from the refinery to the polymerization units by pipe lines without the cost, danger and other difficulties involved in the use of tank cars.

In summarizing, the Minister emphasized the Government control of the whole enterprise. "Private interests have only come into the project because the government has enlisted their knowledge, their technical skill and the results of their extensive research and development work. In other words there are no private strings on the Polymer plant at Sarnia, which is wholly owned by the Government," he said.

Canadian school children will soon begin the collection of tons of milkweed leaves to feed the new pilot mill which the National Research Council hopes will turn out five tons of milkweed rubber at Ottawa this year. This rubber will be used in large scale experiments to verify or disprove laboratory indications that the substance may be a valuable blending agent in the compounding of Buna S.

Economics of the production of rubber from milkweeds were outlined recently by Dr. Nathaniel H. Grace, of the Research Council. The plant requires two years to reach maturity and then yields about a ton of leaves per acre from which 160 to 200 pounds of rubber can be obtained. A simple ball mill process has been developed for extraction of the rubbery gum.

According to Dr. Grace, the product does not appear to be useful as a rubber by itself. He states, however, that "preliminary laboratory indications suggest that the product may be a desirable blending agent for Buna S synthetic rubber. Laboratory tests are to be confirmed or disproved by the commercial blending of several tons of the milkweed product to be extracted from wild stands this autumn. Any further production of milkweek rubber must await the purely experimental program now under way".

Production of Thiokol FA by Naugatuck Chemicals, Ltd., is reported to have started at Elmira, Ontario. In making the announcement, Paul C. Jones, president of Dominion Rubber, the parent company, stated that the material is not to be considered a "war baby" in the Dominion. He said that it has an established place in Canada's future rubber supply, regardless of the natural rubber supply after the war, because it performs functions for which the natural material is unsuitable.

Canadian section of the Society of the Plastics Industry has named a technical committee to work in cooperation with a similar body in the United States. Members of the committee include: J. L. Dean, Duplate, Ltd., chairman; Dr. W. Gallay, National Research Council, vice-chairman; H. A. Gadd, Canadian General Electric, secretary; J. B. Farrell, Percy Hermant & Co.; W. A. Campbell, Bakelite Corporation of Canada; E. D. Jackson, Jos. Stokes Rubber Co., Ltd.; J. D. Benedito, Canadian Resins and Chemicals, Ltd.; P. Gunter, Mack Moulding Co.; and A. E. Byrne, Canadian General Electric.

Appointment of five new directors has recently been announced by the Dominion Rubber Company, Ltd. New members of the board include A. W. Hopton, vice-president and general manager of the tire division at Kitchener; C. C. Thackray, vice-president and general manager of the tank tracks and new products division; G. W. Charles, vice-president and general manager of the footwear division at Montreal; M. O. Simpson, treasurer; and H. S. Marlor, vice-president of the United States Rubber Company.

E. J. Hayes, Gutta Percha and Rubber, Ltd., was elected secretary of the Industrial Advertisers Association of Ontario at the annual meeting held recently in Toronto.

Wage Decision Reaffirmed

On June 30 the National War Labor Board reaffirmed its decision to restrict the wage increase for Akron rubber workers to 3c an hour instead of the 8c an hour increase recommended by a special panel which heard testimony over a period of several months. Although the original announcement of the board to hold the increase to only 3c an hour was the occasion of a 5-day strike in late May, ended with the intervention of President Roosevelt, the reaffirmation of the board resulted in only one or two minor walkouts in Akron plants, which were quickly settled. The latest decision of WLB was reached by a vote of 8 to 4, the labor members dissenting. Although URWA officials were outspoken in their denunciation of the latest decision, they urged all workers to continue at their operations pending further appeals. The increases are retroactive to last July.

OBITUARIES

F. A. Pope

F. Alton Pope, founder and president of the Cleveland Liner & Manufacturing Co., Cleveland, Ohio, manufacturers of Climco Processing Liners and Linerette Interleaving Paper, died in Cleveland on July 6 after a short illness. He was 78 years of age.

Born in Cleveland on May 3, 1865, Mr. Pope spent practically all of his life in that city with the exception of a few years in Salem, Ohio. Prior to founding Cleveland Liner, he was associated with various organizations, and at one time was general manager of the Interstate Foundry Co. In 1918 he organized the Cleveland Mixer & Manufacturing Co. for the production of mixing and agitating equipment.

It was while selling this equipment to the rubber industry that Mr. Pope learned of a process which had been developed by one of the large rubber companies in the Akron area for processing liners so as to prevent the adhesion of stocks. He was much impressed with the method, and so in 1922, after securing the rights to the process, he founded the Cleveland Liner & Manufacturing Co. With the enthusiasm characteristic of him, Mr. Pope launched an aggressive selling campaign for the new business, with the result that in the next twenty years he visited practically every rubber factory in the United States, making friends everywhere he visited.

Two sons subsequently joined Mr. Pope in the operation of the Cleveland Liner concern, Edward A., the older son, taking over most of the selling and travelling, and Ervin C. becoming plant manager. Edward A. Pope, then vice-president of the firm, died in May, 1940, whereupon his brother, Ervin C. Pope, became vice-president and sales manager, which posts he holds at present.

A. E. Bronson

Adelbert E. Bronson, vice-president and secretary of the Dill Manufacturing Co., Cleveland, died on May 26 after a brief illness. Born in Maywood, Ill., Mr. Bronson moved to Cleveland in early boyhood, attended public schools in that city, and entered Princeton University in 1899 where he studied engineering. Prior to joining Dill in 1911, he engaged in engineering work for several years, being one of the organizers of the Bronson-Walton Co., consulting engineers.

Mr. Bronson was elected secretary and sales manager of Dill in 1915 and became a vice-president in 1928. In his early years with the company he was primarily responsible for the development of sales but in more recent years devoted his talents to the development of new products. Mr. Bronson was a member of the Society of Automotive Engineers, the Mid-Day Club, and the Hermit Club. He was a director of a Cleveland Bank as well as of the Dill concern.

For many years Mr. Bronson engaged in municipal activities as a member of the Legislative Committee of the Cleveland Chamber of Commerce. He is survived by one son, his wife having followed him in death twelve days after his own.

Paul A. Polson

Paul Alexander Polson, 40-year old executive vice-president of the Polson Rubber Co., Garrettsville, Ohio, died in the Edwin C. Shaw Sanatorium on June 21, just three days after entering the sanitorium for treatment.

Mr. Polson was born in Kansas City, Kansas, on November 10, 1902, received his early schooling in that city and later attended the Shaw High School in Cleveland where the family moved. Shortly after his graduation from this school the family again moved, this time to Long Beach, California, where for the next two years Mr. Polson was employed as regional director of the Boy Scouts in that area.

In 1926 Mr. Polson began his career with the Polson Rubber Co., devoting his efforts respectively, to territorial sales, specialty sales and sales management. He became vice-president in 1936, holding that position with increasing responsibilities until his death.

Funeral services were held in Garrettsville on June 26. Interment was in California. A widow and one son survive.

Albert D. Thornton

Albert Devereux Thornton, former executive director of the Dominion Rubber Co., died at his home in Westmount, Canada, on June 26, after a short illness. He was 73 years of age. Mr. Thornton received his education in England and after coming to Canada took a post-graduate course in chemistry at McGill University. He joined Dominion Rubber, then known as the Canadian Rubber Co., around 1885, and remained with that company for 40 years until his retirement about 10 years ago. He advanced from post to post with the company, being executive director at the time of his retirement. Mr. Thornton was very active in civic affairs, serving at one time as a Justice of the Peace for the Province of Quebec. Funeral services were held on June 28 at the Church of St. James the Apostle with interment in Mount Royal Cemetery. A widow, son and daughter survive.

Vincent Gehrlein

Vincent Gehrlein, who was associated with the Lovell Manufacturing Co., Erie, Penna., for 49 years before his retirement last October, died in his home in Erie on June 20 at the age of 78 from a heart attack. Born in Germany in 1866, Mr. Gehrlein came to Erie at the age of 6 and lived there the rest of his life. He celebrated his 55th wedding anniversary last May.

Mr. Gehrlein, recognized as one of the oldest and most experienced wringer authorities in this country, retired from the Lovell concern on October 9, 1942, after almost half a century of service. During his tenure with the company, he acted as superintendent of the plant for many years, but about five years ago because of his age he relinquished that post to take up the somewhat lighter duties of production manager, holding that post until his retirement.

Mr. Gehrlein was a member of the Knights of St. John, the St. Jude Society of the Sacred Heart Parish, and of the Maennerchor Club in Erie. Funeral services were held on June 23, with interment in Trinity Cemetery, Erie. A widow and one son survive.

W. Harris Thurston

W. Harris Thurston, head of the fabric concern bearing his name in New York City, died at his home in West Hampton, L. I., N. Y., on June 29 at the age of 52. Born in St. Paul, Minn., in 1891, Mr. Thurston started in the textile field with Clarence Whitman & Co. in 1911 where he received his first training in mechanical fabrics. He remained with that firm until the last war when he entered the Army and was placed in charge of procurement of balloon and airplane cloth. After the war, Mr. Thurston formed a partnership with William D. Martin, Jr., this partnership continuing until August, 1921, when W. Harris Thurston & Co., Inc., was organized, the latter concern specializing in the production and sale of mechanical fabrics, many of which found use in the rubber industry. Among Mr. Thurston's achievements was the development of Byrd Cloth, now widely used in various military capacities.

Frank C. Spargo

Frank Curtlin Spargo, rubber technologist of the Bridgeport, Conn., plant of the General Electric Co., died in his home in Devon, Conn., on June 19 from a heart attack. He was 51 years of age. Born in Saybrook, Conn., on December 26, 1892, Mr. Spargo studied electrical engineering at New Haven College. He joined General Electric at Bridgeport in 1934, previously having served with the U. S. Rubber Co. at Naugatuck and the Seamless Rubber Co. at New Haven, Conn. He was an active member of both the New Haven Section of the American Chemical Society and the New York Rubber Group. He leaves a widow, daughter, and son.

B. M. Robinson

B. M. Robinson, secretary and general counsel of the Firestone Tire & Rubber Co., died in a hospital in Cleveland on July 3 at the age of 56. Death was caused by a brain tumor.

Mr. Robinson joined the Firestone organization in 1918 after serving one term as prosecuting attorney at Brazil, Indiana, and spending three years in private legal practice. He helped organize the company's legal department and was assistant secretary until he succeeded Stacy G. Carkhuff as secretary last January. He had been a director of the company since 1929.

Mr. Robinson had given generously of his time to community activities in Akron, especially to the organization and operation of the United War Chest, of which he was a trustee and a member of the executive committee. Funeral services were held in Akron on July 6, with interment in Rose Hill Cemetery. He leaves a widow, two daughters, and a son.

James J. McKenna

James J. McKenna, purchasing agent for the Western Electric Co., died of a heart ailment at the age of 62 in St. Luke's Hospital in New York City on June 23. Born in Charleston, S. C., Mr. McKenna joined Western Electric in 1902, was placed in charge of production of the London, England, factory in 1913, and in 1920, after serving for a short period with the Firestone Tire & Rubber Co., was named head of the purchasing department of the company's Hawthorne Works in Chicago. In 1922 Mr. McKenna became superintendent of production at Chicago and in 1928 came to New York as purchasing agent for all of the company's manufacturing plants. He was a member of the Railroad-Machinery Club. A widow and daughter survive.

Exhibits Rubber-Like Material

A new rubber-like material, based on an 8% content of neoprene latex, called Norab, was exhibited to a group of rubber chemists and newspaper men by Sam Baron on July 8. The demonstration was staged at 27 West 3rd Street in New York City where Mr. Baron has established an experimental laboratory. The new material is said to have some excellent characteristics for the production of a variety of rubber products, particularly molded goods.

New General Plant Starting

Operations in the recently-acquired Columbiana, Ohio, plant of the General Tire & Rubber Co. are expected to get underway in the immediate future. The plant, formerly the factory of the Franklin Furniture Co., will manufacture life-saving equipment of an undisclosed nature and will employ about 250 workers, mostly female.

Accidents Are Costly

Job accidents in the United States from July, 1940, to January, 1943, the 30 months covering the defense program and the first year of war, brought death to 48,500 workers, cost 258,000 an eye, finger, hand, arm or leg, and laid up 5,300,000 for an average of three weeks each. Days of work lost in these accidents totaled 110,000,000—more than 375,000 man-years.

In the first eighteen months of the war, our announced battle casualties have numbered 12,123 dead, 15,049 wounded, 40,435 missing, and 10,628 prisoners of war, a total of 78,235. This information comes from the U. S. Department of Labor.

Recent Price Interpretations

Some recent interpretations of specific price schedules and regulations, other than the General Maximum Price Regulations, issued by OPA, included the following:

R. P. S. No. 63 (Retail Prices for New Rubber Tires & Tubes)—Maximum prices of white-black and white sidewall passenger car tires of manufacturers' brands are established by Section 1315.110 (i), unless the tire is an Exhibit C tire, since whitewall tires are tires of "other lines, levels, qualities, or weights" within the meaning of that section. The maximum prices set forth in Section 1315.110 (a) are not applicable, since these maximum prices are for black 4-ply cotton tires of one of the brands listed in Section 1315.110 (b).

M. P. R. No. 107 (Used Tires & Tubes)—A seller need not state the non-skid design depth of a regrooved tire; it is sufficient to state that a tire, which is a "regrooved tire" within the meaning of Section 1315.1358 (a) (7), is regrooved. If the tire has a regroove of 2/32 inches or less, it is a basic tire carcass and the seller must so state as required in Section 1315.1355 (Records and Reports). If the tire is not a basic tire carcass, the depth of the regrooved non-skid design makes no difference in the maximum price.

M. P. R. No. 220 (Certain Rubber Commodities)—A manufacturer may not use the highest price charged during March, 1942, for articles made of rubber as the maximum price for articles now made of a substitute rubber material, unless the substitution is only a minor change, as defined in the regulation. The applicable pricing method contained in the regulation must be used.

M. P. R. No. 200 (Rubber Heels)—The regulation does not apply to the sale of rubber heels by hardware or five-and-ten- cent stores; only "rubber heels sold in the shoe repair trade" are covered by the regulation.

George L. Mathewson

George L. Mathewson, president of the Buffalo Weaving & Belting Co., Buffalo, died suddenly at his summer residence in Thunder Bay, Ontario, Canada, on June 27. He was 54 years of age. Born in New Jersey, Mr. Mathewson moved to Buffalo as a boy. He received his education at the Nichols School and Harvard University and shortly after being graduated from Harvard in 1909 he joined Buffalo Weaving, remaining with that firm all of his life except for one year during the last war when he was connected with the Ordnance Department of the Army in Washington, D. C. Mr. Mathewson became president of Buffalo Weaving in 1923, holding that position until his death. He was a member of the Harvard and Saturn clubs. A widow, two sons, and two daughters survive.

Robert W. Laird

Robert W. Laird, treasurer of the Avon Sole Co., Avon, Mass., died suddenly on May 16 following a heart attack suffered in his home in Brockton, Mass. Mr. Laird was the son of the late John A. Laird, founder of the once well-known shoe firm of Laird, Prior & Co., of Brockton. He was a graduate of Harvard University and of the Harvard Law School. He succeeded the late Everett Packard as treasurer of Avon Sole a few years ago.

California Hears Jordan

Herman Jordan, Pacific Coast representative of the Rubber Chemicals Division of E. I. du Pont de Nemours & Co., Inc., and president of the Northern California Rubber Group, was the principal speaker at a meeting of that group held in the Hotel Claremont in Berkeley, California, on June 24. Approximately 40 members and guests were in attendance.

Mr. Jordan gave the highlights of a recent trip to the East and told of the conversion steps from crude to synthetic rubber being taken by various manufacturers throughout the country. He urged his listeners to take similar steps and to cooperate openly with officials of the Office of the Rubber Director in Washington, D. C. He also gave a summary of the various types of neoprene, explaining the application of each type under present conditions.

After a brief business meeting, during which it was decided to hold an outing on August 8, a motion picture, entitled "Facts About Fabric," was shown. Special prizes, consisting of two quarts of 30-year old Bourbon, donated by the Columbia Steel Co., were won by George Graham (Reliance Rubber) and Victor F. Sagues (Plant Rubber & Asbestos). Other prizes, consisting of DuPont paint, donated by DuPont through Mr. Jordan, went to Messrs. Petelin, Swain, Lycett, Page and Greene. Table favors, consisting of rubber suction cups, furnished by DuPont, were also distributed.

TO HIT 'EM H-A-R-D-E-R

THE year 1943 promises to be the grimmest, hardest year this country has ever faced. Every effort, and every dollar of national income not absolutely needed for existence, should go into war work and War Bonds.

In the Pay Roll Savings Plan, America finds a potent weapon for the winning of the war—and one of the soundest guarantees of the preservation of the American way of life!

Today about 30,000,000 wage earners, in 175,000 plants, are buying War Bonds at the rate of nearly half a billion dollars a month. *Great as this sum is, it is not enough!* For the more dollars made available now, the fewer the lives laid down on the bloody roads to Berlin and Tokio!

You've undoubtedly got a Pay Roll Savings Plan in your own plant. But how long is it since you last checked up on its progress? *If it now shows only about 10% of the gross payroll going into War Bonds, it needs jacking up!*

This is a *continuing* effort—and it needs *continual* attention and *continual* stimulation to get fullest results.

You can well afford to give this matter your close personal attention! The actual case histories of thousands of plants prove that the successful working out of a Pay Roll Savings Plan gives labor and management a common interest that almost inevitably results in better mutual understanding and better labor relations.

Minor misunderstandings and wage disputes become fewer. Production usually increases, and company spirit soars. And it goes without saying that workers with substantial savings are usually far more satisfied and more dependable.

And one thing more, these War Bonds are not only going to help win the war, they are also going to do much to close the dangerous inflationary gap, and help prevent post-war depression. The time and effort *you* now put in in selling War Bonds and teaching your workers to save, rather than to spend, will be richly repaid many times over—now and when the war is won.

★ ★ ★

You've done your bit Now do your best!

This space is a contribution to victory today and sound business tomorrow by THE RUBBER AGE

NEW EQUIPMENT

Rotary Classifier for Rubber Parts

Although originally developed for a major munitions manufacturer to select or classify increment powder charges, fairly uniform, but with different weight tolerances, the six-scale rotary sorting machine recently introduced by the Exact Weight Scale Co., Columbus, Ohio, illustrated herewith, has been found suitable for

many other applications, including the selection of small rubber parts, which are also generally uniform but may require selection due to different weight tolerances. The machine is said to perform a volume job accurately and swiftly and automatically, thereby saving many man-hours and eliminating bottlenecks.

The six-scale rotary classifier travels in a counter-clock-wise direction at approximately 8 revolutions per minute, producing 48 selected weights per minute. Parts to be weighed or classified are discharged from the revolving scale platters through a series of openings in the table top. The classifier can be furnished with modifications to suit various operations and parts to be weighed or classified.

Improved Stock Cooling Racks

The stock cooling racks featured by the Spadone Machine Co., 122 East 25th Street, New York, 10, N. Y., have been completely redesigned. These racks offer a convenient method for storing materials that require cooling or air drying, the perforated trays being held in elevated position, when desired, by a simple locking mechanism. Each tray ordinarily rests on a slight incline to permit maximum air circulation. The side frame is "A" shaped, thus giving free access to the trays. The trays have light angle iron frames, with perforated metal surface, and are specially spaced for storing bulky materials. The supporting frame is strongly braced at top and bottom. The racks can be mounted on heavy duty casters if preferred. These racks, which consist of twenty perforated metal trays, are said to be of particular advantage for rubber batches when stripped from the mill and equally serviceable for handling tubes and strips produced on the extruder.

Johnson's Wax Finishes for Rubber Goods

• Like so many products, Johnson's Wax Finishes for Rubber Goods have gone to war. They are available now for materials and products made specifically for war use only.

If you are a manufacturer of rubber products for war use, Johnson's Wax Finishes may very well be helpful to you. They prolong the life of rubber goods because they retard oxidation, the destroyer of rubber. Johnson's Wax Finishes for Rubber Goods are easy to apply by dipping, spraying or wiping. Coverage is good. Sizes available: 5 and 55 gallon drums.

Some day . . . and we hope it isn't too far away . . . we shall again be able to supply wax finishes to manufacturers for peacetime use on rubber goods such as automobile door gaskets, rubber hose, tubing, rubber-covered wire, refrigerator gaskets, tires, stair tread, and the like. These wax finishes not only protect by retarding oxidation, but they also add greatly to appearance value.

But for the duration, Johnson's Wax Finishes for Rubber Goods must serve Uncle Sam first.

★ BUY U. S. WAR BONDS AND STAMPS ★

S. C. JOHNSON & SON, INC.
Industrial Wax Division, Dept. RA-73
Racine, Wisconsin

Improve the tack WITH

CRYSTEX insoluble SULPHUR

Crystex, an amorphous sulphur, improves the tack by preventing bin-cure and dryness which usually occur when a high percentage reclaim compound is used.

Crystex prevents bloom in uncured rubber stocks. It does not dissolve in rubber but will "stay put" at temperatures usually prevailing during storage periods. Crystex is of outstanding value when employed in the manufacture of stocks to be used for repair materials, in retread stocks, valve-patch frictions, and other products.

The characteristics of Crystex indicate that further uses may be found for this product in the rubber making industry.

OTHER RUBBERMAKERS' CHEMICALS

Commercial Rubbermakers' Sulphur, Tire Brand, 99½% Pure
Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure
Carbon Tetrachloride, Carbon Bisulphide
Caustic Soda, Sulphur Chloride

Stauffer CHEMICALS SINCE 1885

STAUFFER CHEMICAL CO.

420 LEXINGTON AVE., NEW YORK, N. Y.
444 LAKE SHORE DRIVE, CHICAGO, ILL.
624 CALIFORNIA ST., SAN FRANCISCO, CAL.
555 SO. FLOWER ST., LOS ANGELES, CAL.
424 OHIO BUILDING, AKRON, OHIO
NORTH PORTLAND, OREGON
HOUSTON, TEXAS APOPKA, FLORIDA

One-Piece Industrial Thermometer

In an effort to save critical metals, the Taylor Instrument Companies, Rochester, N. Y., have designed and introduced a new one-piece industrial thermometer. The one-piece case is shallower which makes it possible to see the mercury column through a wider angle of

vision. The chromium-plated bezel fits snugly into the grooved case in such a way as to hold the thick glass front securely against four wavy tension springs. These springs are fastened securely under the scale by shakeproof screws. This construction results in a dustproof, rattleproof, and practically fumeproof thermometer. It can withstand vibration and severe shocks.

The company has announced further that the new instruments will be equipped with easy-reading Binoc tubing. They will be furnished in many combinations of straight and angle stems, with threaded or union connections, and in many standard temperature ranges, within the limits of —40°F. to +750°F. Standard scale lengths are *7"* and *9"*. Numerals are bold and clear, standing out sharply against a contrasting background.

BRIEFS . . . .

Stearns Magnetic Manufacturing Co., Milwaukee, has announced a complete **line of circular lifting magnets** to supplement its current lines of magnetic separators, suspended magnets, and rectangular lifting magnets. The new magnets are available in various specifications, weighing from 450 to 8900 pounds.

A new line of **direct-current vertical motors**, ranging from 40 to 200 h.p. at 1750 r.p.m., and in equivalent ratings at other speeds, has been announced by the General Electric Co., Schenectady, N. Y. They are designed for low-thrust, solid-shaft applications on pumps and machine tools.

Aircraft Standard Parts Co., Rockford, Ill., has introduced a new line of **Aero-Seal Hose Clamps** in fourteen sizes from ¾-inch to four inches inside hose diameter.

SPECIALISTS

in the manufacture of machinery for

THE RUBBER INDUSTRY

ALSO GENERAL MACHINE WORK

★

We are listing some of the LABOR SAVING machines that we manufacture as follows:

TIRE BUILDING DRUMS AND MOLDS

FOR ALL SIZES AND TYPES OF TIRES

BAND BUILDERS
with squeegee applicators

MECHANICAL PRESSES
200 - 400 - 750 ton sizes

TIRE PRESSES
45" - 55" - 65"
singles and duals

The Akron Standard Mold Co.

Akron — "The Established Measure of Value" — Ohio

USMC Lining Trimming Machine
Model B

USMC Lining Trimming Machine

Model B

THE USMC Lining Trimming Machine—Model B, is especially designed for trimming the surplus lining of Rubber Boots, Pacs, Lumbermen's Boots and Gaiters.

This machine not only insures uniform trimming, but does the work more economically than any other method.

It has an individual motor drive and is portably mounted allowing the work to be handled efficiently.

A number of these machines are being used in various Rubber Footwear Factories with excellent results.

Machines are sold outright.

Write to the nearest branch for prices and further particulars.

United Shoe Machinery Corporation

BOSTON, MASSACHUSETTS

Auburn, Maine.....38 Minot Ave.
Brockton, Mass.....93 Centre
Chicago, Ill.....500 South Franklin
Cincinnati, Ohio.....407 East Eighth
Harrisburg, Pa.....20 So. Fourth
Haverhill, Mass.....145 Essex
Johnson City, N. Y.....19 Jennison Ave.
Lynn, Mass.....525 Union
Milwaukee, Wis.....922 North Fourth
Nashville, Tenn.....901 Church St.
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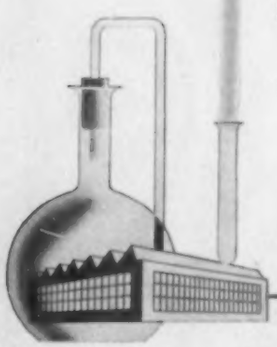

UNION BAY STATE Company

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Comments on "Solution Reclaim"

(Continued from page 339)

of most of the rubber (as described in U. S. Pat. 1,182,071 and Fr. Pat. 460,273), is treated with cold xylol to remove most of the rubber still adhering to the fibres, and centrifuged. It is next boiled in a digester with fresh solvent at 100° to 110°C. under a vacuum. More solvent is added and the temperature raised to 150°C. The cleaned fibres are removed, dried, and may be bleached to be re-used as new fibres. (Debarge, U. S. Pat. 1,248,463, Dec. 4, 1917).

Waste rubber is swollen in ether, benzine, and even acetone or water, by heating in a closed vessel under pressure at a temperature below 130°C., and then the pressure is released suddenly, whereby the swollen mass will explode into a disintegrated spongy mass which will dissolve easily in ordinary solvent or which can be admixed with other rubbers. (Haertel, U. S. Pat. 1,310,013, July 15, 1919).

Waste rubber is placed in a perforated drum rotating partly submerged in a liquid rubber solvent. By heating the solvent while the drum is being rotated, the rubber will dissolve completely in the solvent, leaving the fillers and other insoluble compounded ingredients in the drum, or as setting in the rubber solution. (George, U. S. Pat. 1,385,869, July 26, 1921; Fr. Pat. 534,386).

Waste vulcanized rubber, which may be in the form of whole tires containing the carcass and tread, is placed in a drum with benzene or other solvent, and the drum rotated while being heated. The pressure of the solvent vapors forces the rubber solution into a precipitating tank. Any insoluble filler and fibres may be filtered out before precipitation of the rubber. The solvent is recovered and re-used, while the precipitated reclaimed rubber may be used for producing rubber articles, with or without new rubber. (Navone, U. S. Pat. 1,424,668, Aug. 1, 1922).

Waste vulcanized rubber is placed in a vessel with kerosene oil, and heated at 120° to 190°C. until all the rubber has been dissolved completely. Any inorganic fillers, fibres, etc., are decanted or filtered, and the clear solution is precipitated with alcohol, preferably together with a solvent for the alcohol, such as carbon disulfide, carbon tetrachloride, etc., thereby precipitating the reclaimed rubber which can be purified by re-dissolving and re-precipitation. (Miller, U. S. Pat. 1,641,598, Sept. 6, 1927).

FROM A CONTANT READER

(EDITOR'S NOTE: The writer of this letter is known to the editors. His name must remain anonymous for pertinent reasons.)

Totally inclosed **polyphase induction motors,** in sizes from 1 to 20 h.p., for operations where magnesium dust hazards exist, have been developed by the General Electric Co., Schenectady, N. Y. The new motors feature non-sparking bronze external fans, relatively straight and smooth external ventilating passages to facilitate cleaning, permanent sealed-in leads, and a rotating labyrinth seal at shaft openings.

A new portable dust collector, known as the **Bargar Safe-Aire**, designed to provide a simple, flexible and inexpensive dust collection system for plants where such control is needed, has been made available by the Bargar Sheet Metal Co., Cleveland.

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REVIEWS

BOOKS

The Chemistry of Large Molecules. Edited by R. E. Burk and Oliver Grummitt. Published under the auspices of Western Reserve University by Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y. 6 x 9 in. 313 pp. $3.50.

It is the custom for universities and colleges to have a rather small number of professors who may be specialists in certain fields, such as physical, organic, inorganic, and analytical chemistry, but one or a few professors in each of these fields can no longer hope to master the entire field, nor therefore to present a well-proportioned impression of the subject to graduate students.

To meet this difficulty, Western Reserve University recently conceived the idea of inviting distinguished scientists in the field of chemistry and closely related fields to be "professors for a day." Each of these men presents two lectures, giving him an opportunity to present a substantial view of his work. This book, the first volume in a series to be presented under the title of "Frontiers in Chemistry," is the result of some of those lectures.

The book actually consists of 8 articles, or lectures, each contributed by an outstanding expert. These are: (1) The Mechanism of Polyreactions, by H. Mark; (2) The Investigation of High Polymers with X-Rays, by H. Mark; (3) The Colloidal Behavior of Organic Macromolecular Materials, by Elmer O. Kraemer; (4) The Ultracentrifuge and Its Application to the Study of Organic Macromolecules, by Elmer O. Kraemer; (5) Elastic-Viscous Properties of Matter, by Arthur Tobolsky, Richard E. Powell, and Henry Eyring; (6) The Electrical Properties of High Polymers, by Raymond M. Fuoss; (7) Organic Chemistry of Vinyl Polymers, by C. S. Marvel; (8) Chemistry of Cellulose and Cellulose Derivatives, by Emil Ott. The corporate affiliations of these experts is too well known to bear repetition here.

From the subject matter of each article, or lecture, it will be noted that although each contributor has furnished data on some specific phase, the whole represents a complete discourse on the chemistry of large molecules. Bibliographies are furnished at the end of each chapter by each author. A complete subject index has been provided by the editors, who have also included pictures of the lecturers and short biographical sketches about each of them to compensate in part for the reader's lack of personal contact, enjoyed by the participants of the lectures themselves.

Western Reserve University is to be complimented upon the origination of the "professor for a day" idea and for sponsoring the publication of the lectures in book form.

•

Foremanship Training. Edited by Capt. Richard B. Starr. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y. 5 x 7¼ in. 191 pp. $2.65.

This is a practical handbook of modern industrial supervision, representing the many years of industrial experience of the members of the original instruction force which, under the Engineering Defense Training Program, launched by the government, began in 1940 to prepare Chicago industries for the war effort. It contains positive suggestions for the handling of the foreman's daily problems, and it uses case histories drawn from actual experience to illustrate the techniques. Such subjects as job training, job evaluation, time and motion study, industrial safety, and sources and handling of grievances are covered. The handbook is divided into 11 chapters, and is provided with a subject index.

Micromeritics: The Technology of Fine Particles. By J. M. DallaValle. Published by Pitman Publishing Corp., 2 West 45th St., New York, N. Y. 6 x 9 in. 413 pp. $8.50.

The fundamental aspects of particle measurement and the physical and chemical behavior of fine particles are emphasized in this book, believed to be the only one of its kind that treats with the behavior and characteristics of the many-sized particles outside the colloid group, ranging from the submicroscopic to approximately one inch in diameter. The author, a consulting and research engineer, well known in the field of fine particle technology in industry and public health, offers the term "Micromeritics" as "the science of small particles."

Considerable information, representing years of careful accumulation, is provided on particle measurement, size distributions, packing arrangements, and physical properties. Industrial applications covered are representative of the many fields in which fine particle technology is significant. Symbols used, for the most part, are those of the American Standards Association.

The book has 18 chapters in all, a selected bibliography, and complete author and subject indexes. There is also an appendix giving useful constants and conversion factors of frequent occurrence. Industries with industrial dust problems, which includes the rubber industry, should profit from the intensive research revealed in this book.

•

The Goodyear Research Laboratory. By David Dietz. Published by the Goodyear Tire & Rubber Co., Akron, Ohio. 6 x 9 in. 58 pp.

Issued in connection with the dedication ceremonies attendant to the formal opening of Goodyear's new research laboratory in Akron last month, this book, written by the science editor of the Scripps-Howard Newspapers, is more than just a description of the new laboratory, since it briefly embraces the story of rubber and the story of Goodyear. In addition, it covers some of the research achievements credited to Goodyear scientists over the years. The description of the laboratory itself is confined to a few pages, detailing some of the equipment currently installed and the objectives planned for it. (Editor's Note: A complete description of the laboratory will also be found elsewhere in this issue.)

•

Synthetic Adhesives. By Paul I. Smith. Published by the Chemical Publishing Co., Inc., 26 Court St., Brooklyn, N. Y. 5½ x 8½ in. 125 pp. $3.00.

The scope of synthetic adhesives has increased by leaps and bounds during the last ten years and there are today hundreds of different types of cements produced to solve problems which before seemed impossible of solution. This new reference book describes the main types of synthetic adhesives, including chlorinated rubber and synthetic rubber cements, cellulose adhesives, and urea-formaldehyde glues, emphasizing their peculiar properties and major applications. The general applications of synthetic adhesives in industry are discussed, as is the use of such adhesives in the manufacture of aeronautical improved plywood and high-density woods. The book has 10 chapters and a subject index.

•

Extender 600. Standard Chemical Co., Akron Savings and Loan Building, Akron, Ohio. 8½ x 11 in. 8 pp.

The advantages of using Extender 600, the special modified vegetable oil copolymer developed especially as a plasticizer and extender, in various types of synthetic rubber and reclaim stocks are emphasized in this bulletin. Some formulas and physical test results are included. It is reported that 30 parts of Extender 600, when used in a typical channel black-reinforced Buna N-type stock, gives a tensile of over 3,000 pounds and an elongation of over 500%.

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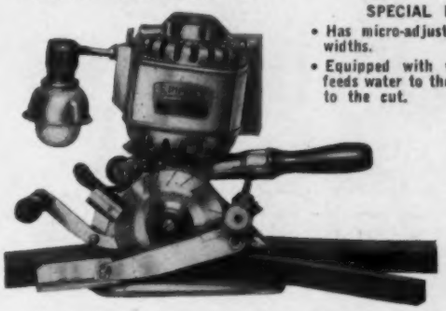

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*ORVUS is a sulfated alcohol type cleanser—not a soap.

BOOKLETS, CATALOGS, Etc.

Synthetic Rubber: Its Production from Petroleum, Coal, and Other Materials. By W. C. Holliman. Information Circular No. 7242, issued by the Bureau of Mines, Department of the Interior, Washington, D. C. 8 x 10½ in. 36 pp.

This report catalogues for quick reference general information regarding the chemistry and physical properties of the synthetic rubbers produced commercially in the United States and other countries. The information was taken largely from technical journals, and a five-page bibliography listing the sources is included. A good deal of general information is furnished by the report, including data on the bunas, Perbunan, Hycar, Chemigum, neoprene, Vistanex, butyl rubber, Flexon, Thiokol, Koroseal, Flamenol, and Agripol. Brief descriptions of some of the foreign rubber-like materials, including German buna, Russian SKA and SKB, Polish Ker, Sovprene, Mustone, Oppanol, Ethanite, Perduren, and Vulcaplas, are given. The report should serve as excellent background material for chemists and engineers, as well as the layman.

•

Suprex Clay in Buna S. (Bulletin No. 2). J. M. Huber, Inc., 460 West 34th St., New York, N. Y. 8½ x 11 in. 12 pp.

Tables showing the effect of Suprex Clay on the rate of cut growth, on the stress-strain properties, and on the physical properties of Buna S tread compounds are included in this latest report on Suprex Clay in Buna S. Other tables show the effect of various pigments on the rate of cut growth and the effect of addition of Suprex Clay vs. magnesium carbonate on the properties of similar compounds. A final table gives the comparison between a Buna S tread compound containing Suprex Clay and a natural rubber tread compound. Among the conclusions made is that the addition of from 7.5 to 10 parts of Suprex Clay to a Buna S tread compound produces a remarkable improvement in resistance to cut growth.

•

Packaging Catalog: 1943. Published by the Packaging Catalog Corp., 122 East 42nd St., New York, N. Y. 9 x 11½ in. 633 pp. $2.50.

The latest edition of this attractive catalog furnishes a review of a year and a half of packaging goods for war and under wartime conditions. It illustrates the many ingenious packages developed to handle munitions, rations, ordnance, and civilian supplies. The many substitute containers and packaging materials developed to meet wartime shortages are illustrated and analyzed. There are several valuable charts in the catalog, as usual, including one on packaging materials under government control. Another important chart is one listing the tensile strength, tear resistance, chemical qualities, and other essential properties of numerous packaging materials.

•

Witcogum—A New Chemurgic Rubber. (Report No. 43-3). Witco Research Laboratories, 6200 West 51st St., Chicago, Ill. 8½ x 11 in. 12 pp.

The properties and characteristics of Witcogum, the new chemurgic rubber recently announced by Wishnick-Tumpeer, Inc., are outlined in this report. Some information on processing procedure and the effect of solvents and chemicals is also furnished. The use of the new material with reclaim, crude and synthetic rubber, including specific formulas, is discussed. Advantages of the material over similar types is emphasized.

Compounding of Buca in Synthetic Rubbers. Moore and Munger, 33 Rector St., New York, N. Y. 8½ x 11 in. 25 pp.

The results of tests recently conducted by Moore and Munger to determine the effectiveness of Buca, the recently-introduced pigment, in synthetic rubber compounds are given in this technical booklet. A number of formulas and physical test results, including tensile, elongation, and modulus at 300%, are listed. Of special interest is a comprehensive report of the company's experience in building a 7.50-20 truck tire with GR-S. Formulas of the two best tread stocks developed by the company to date as a result of this work are included.

•

Witco Carbon Blacks in Natural Rubber, GR-S, Reclaim and GR-M. (Report No. 43-2). Witco Research Laboratories, 6200 West 51st St., Chicago, Ill. 8½ x 11 in. 16 pp.

The physical properties and the behavior in natural and synthetic rubber of four of the more popular grades of Witco channel black are briefly summarized in this report. Two of the company's new channel blacks, Witco No. 12 and Witco No. 14, both developed to fill the need for easier processing and for lower heat generation, are compared in the report to the standard type black, Witco No. 1, and the extreme fine particle size black, Witco No. 6, to serve as a guide in selecting the grade of the company's black best suited to a particular problem.

•

Vulcanization of GR-I. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11¼ in. 8 pp.

This laboratory report, dated June 10, 1943, supersedes the company's booklet of April 30, 1943. In the previous booklet, issued under the same title, the data reported was based on GR-I available at the time. The experimental work was subsequently repeated with the GR-I now commercially available, and the later results are reproduced in the current laboratory report. From the new report it is apparent that the GR-I presently being produced is faster curing and has higher tensile properties. Less heat treatment after initial cure may be used following the short forming cure in the mold.

•

Selenac in GR-S Compounds. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 8½ x 11¼ in. 12 pp.

Comparisons between GR-S sulfurless Selenac compounds and GR-S compounds containing sulfur are furnished in this new laboratory report. Formulas and physical test results are given. From the tests conducted it is reported that the sulfurless Selenac compounds have greater elongation than similar compounds cured with sulfur, that they retain their elongation at elevated temperatures better, and that they maintain their physical properties after heat aging better than similar sulfur-cured compounds.

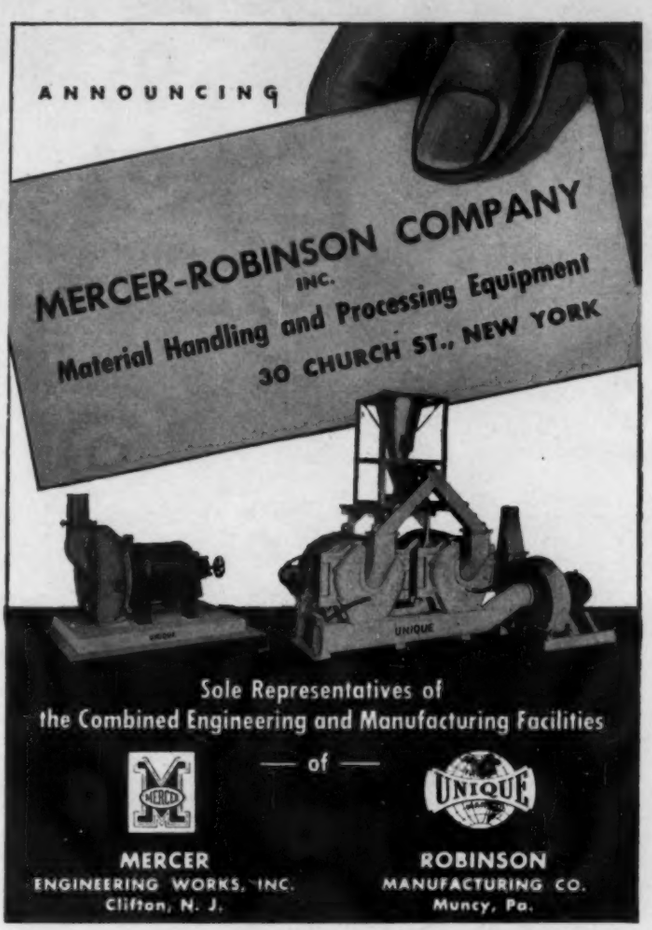
•

Wheelco Measuring and Control Instruments. (Bulletin No. Z-6000). Wheelco Instruments Co., Harrison and Peoria Streets, Chicago, Ill. 8½ x 11 in. 16 pp.

This bulletin is a condensed listing of the company's complete line of measuring and control instruments. It describes and illustrates unit construction of temperature controllers and explains the company's "electronic principle" for effecting control without contact between the measuring and control functions of the instrument. Remote controllers, combustion safeguard equipment and other instruments are also covered.

•

Education in the case and use of fire extinguishers is especially important in wartime. With this thought in mind, the American-LaFrance-Foamite Corp., Elmira, N. Y., has issued a booklet on **Maintenance of First Aid Fire-Fighting Equipment.**



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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, JULY 13, 1943

Crude Rubber

ONE of the latest agricultural products to be put under investigation for its rubber-producing possibilities is the jojoba bush, which grows in arid regions, particularly in the American Southwest. A recent report from the Glidden Co., of Cleveland, indicates that a rubber-like material, which exhibits good resistance to acids and alkalies, can be extracted from the jojoba nut. The company is cultivating the bush scientifically on a large experimental farm in Arizona and announces that it has met with some success to date, although no data on yield per acre has yet been made available. A liquid wax taken from the jojoba nut, when treated, is said to produce a factice-like material.

Increasing imports of wild rubber from Latin America are encouraging to American officials charged with rubber procurement, although specific figures are considered military secrets. However, reports received from the Office of the Coordinator of Inter-American Affairs indicate that considerable progress is being made in collection efforts launched in practically every South American country, as well as in those of Central America. The recently-established Inter-American Institute of Agricultural Sciences, headed by Dr. Earl N. Bressman, has purchased the Goodyear plantation in Panama.

Brazil continues to lead all Latin American countries both in the actual shipments of wild rubber to this country and in efforts to stimulate collection. The month of June was designated by official decree as "Rubber Month" in the country, timed to coincide with the launching of special collection efforts. The current month of July has been termed "Scrap Rubber Month," also by official decree.

Prices shown below are those set by the Rubber Reserve Company:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21⅜	38⅞
Thin Brown Crepe, 1X	21⅜	38⅞
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅛	38⅜
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Curde	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12⅜	26⅛
Upriver Coarse, Washed & Dried	20¼	37¾
Caucho Ball, Crude	11⅜	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C, for Civilian Use; N-C, for Non-Civilian Use.

Scrap Rubber

Ceiling prices for scrap rubber consisting of tires or made from tires, at levels generally $2.00 per ton above previous prices, were established by OPA on June 29 with the issuance of Amendment No. 7 to the scrap rubber price order, RPS 87. Because the increased cost of the scrap, which will reduce the government subsidy cost by approximately $1,000,000 annually, will be borne by the reclaimers, it will have no effect upon consumer prices of finished rubber products using reclaim. Specific ceilings were again set for different items at the chief consuming centers. The increase was decided upon after numerous meetings with the reclaimers. There are still large supplies of scrap on hand to meet all current demands from the reclaiming field. Prices shown below are ceilings on typical grades of scrap rubber:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¼
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 7.818
40x40	36 in.	6.15	lb.	—	@ 6.991
40x36	36 in.	6.50	lb.	—	@ 6.615
48x48	40 in.	2.50	lb.	—	@16.200
48x48	40 in.	2.85	lb.	—	@14.210
56x60	40 in.	3.60	lb.	—	@11.944
48x44	40 in.	3.75	lb.	—	@11.066

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton of 20.37c at the ten designated southern markets.

Cotton

The price of middling uplands on the Cotton Exchange has swung in the narrow range of 46 points since our last report, high for the period being 21.98 on the first day of the new report, June 15, and low, 21.52 on July 10. The average price for the month of June was 21.92, based on 26 trading days. The price declined steadily in mid-June, the confusing situation in Washington being the prime reason for the market's hesitancy, with the encouraging war news a close second. Liquidation and hedging movements were very much in evidence, particularly on the part of nervous holders. The market developed a steadier tone in late June and early July, as Congress gave evidence of clarifying major issues before adjourning, but has again developed a declining trend in the past few days. According to the Crop Reporting Board of the Department of Agriculture, cotton acreage in cultivation as of July 1 was 21,955,000 acres, the smallest in records going back more than forty years. The figure is lower than the 22,220,000 acres previously estimated by the *Journal of Commerce*. The government's figure indicates a drop of 5.6% from last season. Quotations for middling uplands on the Exchange follow:

	June 14	July 13		
	Close	High	Low	Close
July	20.21	20.70	20.64	20.70
October	19.83	20.13	20.06	20.13
December	19.64	19.96	19.91	19.96

Reclaimed Rubber

Because of the loosening of some of the restrictions on the use of reclaimed rubber, the demand for this material continues at the same high levels witnessed in recent months. Although reclaimers will now pay approximately $2.00 per ton more for tire scrap, in accordance with Amendment No. 7 to RPS 87, the scrap rubber price order, they will not in turn increase their prices, absorbing the difference in cost. As the crude rubber stockpile grows smaller with each passing month, all reclaimers are preparing to handle synthetic scrap which, they claim, can be handled without major changes in present production methods. The outlook for the reclaiming industry looks good for some time to come. Prices shown below are ceilings on typical reclaim grades:

Shoe			
Unwashed	lb.	.07 @	.07¼
Tube			
Black Tube	lb.	.11¼ @	.11½
Red Tube	lb.	.12 @	.12¼
Tires			
Black (acid process)	lb.	.07½ @	.07¾
Black, selected tires	lb	.06½ @	.06¾
Truck, Heavy Gravity	lb.	.08½ @	.08¾
Miscellaneous			
Mechanical blends	lb.	.04½ @	.05½
White	lb.	.13 @	.13¼

Ducks

Enameling (single filling)	lb.	— @	.44½
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¼
Double filling, A grade	lb.	— @	.20¼

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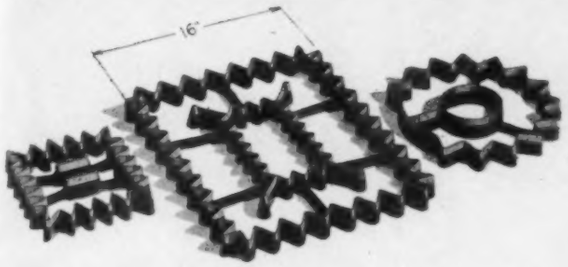

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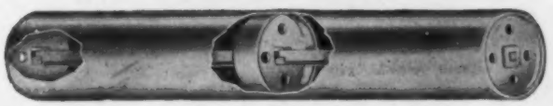

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New York, July 13, 1943
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28 @	.33
A-10	lb.	.36 @	42
A-11	lb.	.52 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.60 @	.70
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.43 @	.45
Beutene	lb.	.59 @	.64
B-J-F	lb.	.38 @	.43
Butyl Zimate	lb.	— @	1.13
Captax	lb.	.38 @	.40
Crylene	lb.	.40 @	.47
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.36
El-Sixty	lb.	.40 @	.47
Ethyl Zimate	lb.	— @	1.13
Ethylidine aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.31 @	—
Guantal	lb.	.40 @	.50
Hepteen	lb.	.34 @	.39
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.13 @	—
Witco	lb.	.15 @	—
Ledate	lb.	— @	1.48
Methyl Tuads	lb.	— @	1.53
Methyl Zimate	lb.	— @	1.23
Monex	lb.	— @	1.53
Pentex	lb.	.74 @	.84
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	— @	1.65
R & R 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	1.55 @	1.70
Rotax	lb.	.48 @	.50
Safex	lb.	1.15 @	1.25
Selenac	lb.	— @	1.98
SPDX	lb.	.70 @	.75
Super-Sulfur No. 2	lb.	.13 @	.15
Thiocarbanilid, drums	lb.	.28 @	.33
Thiurad	lb.	— @	1.55
Trimene	lb.	.54 @	.64
base	lb.	1.03 @	1.18
Triphenylguanidine	lb.	.45 @	—
Ulto	lb.	1.25 @	1.75
Ureka	lb.	.50 @	.75
Blend B	lb.	.50 @	.57
Blend C	lb.	.48 @	.55
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Next Column)			
Blues [b]			
Prussian	lb.	.36 @	—
Ultramarine	lb.	.17 @	.27
Browns [b]			
Mapico	lb.	.1135@	—
Umber, Turkey	lb.	.04¾ @	—
Greens [b]			
Chrome	lb.	— @	.25
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	— @	—
sulfur, free	lb.	— @	—
Indian	lb.	.08¾ @	—
Domestic (Maroon)	lb.	.11 @	—
Mapico	lb.	.096 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red	lb.	.09¾ @	—
Whites [b]			
Cryptone No. 19	lb.	.0560@	.0585
Cryptone CB No. 21	lb.	.0560@	.0585
Cryptone ZS-800	lb.	.0825@	.0850
Lithopone:			
Albalith	lb.	.04¼ @	.04½
Astrolith	lb.	.04¼ @	.04½
Azolith	lb.	.04¼ @	.04½
Ray-cal	lb.	.05½ @	.05¾
Rayox	lb.	.14½ @	.15¼
Titanox A	lb.	.14½ @	.14¾
Titanox B	lb.	.05¾ @	.06
Titanox C	lb.	.05½ @	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼ @	.07½
Anaconda, lead free	lb.	.07¼ @	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼ @	.07½
XX Red—4	lb.	.07¼ @	.07½
XX Red—72	lb.	.07¼ @	.07½
XX Red—103	lb.	.07¼ @	.07½
Kadox, black label—15	lb.	.07¼ @	.07½
Red label—17	lb.	.07¼ @	.07½
St. Joe, black label	lb.	.07¼ @	.07½
green label	lb.	.07¼ @	.07½
red label	lb	.07¼ @	.07½
U. S. P.—7, bbls.	lb.	.10½ @	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½ @	.09¾
Green seal—8	lb.	.09 @	.09¼
Red seal—9	lb.	.08½ @	.08¾
Yellows [b]			
Cadmolith	lb.	.55 @	.60
Chrome	lb.	— @	.50
Mapico	lb.	.071 @	—

BLACKS
(In bags, carload lots)

Aerfloted Arrow		.0355@	—
Certified		.0355@	—
Certified Spheron		.0355@	—
Channel "S"		.12 @	—
Continental		.0355@	—
Disperso		.0355@	—
Dixiedensed		.0355@	—
Dixiedensed 66		.0355@	—
Excello		.0355@	—
Furnex		.03½ @	.06
Furnex Beads		.03½ @	.06
Gastex		.03½ @	.06
Kosmobile		.0355@	—
Kosmobile 66		.0355@	—
Kosmos-Dixie 20	lb.	.03½ @	.06
Micronex (Amarillo)		.0355@	—
Micronex Beads (Amarillo)		.0355@	—
Pelletex		.03½ @	.06
P-33		.0475@	—
Shell Carbon (Del. Midwest)		.025 @	—
Sterling		.035 @	—
Supreme		.0355@	—
Thermax		.0225@	—
Thermax "S"		.0675@	—
Wyex		.0355@	—

COMPOUNDING MATERIALS

Aluminum Flake	ton	18.00	@24.50
99½%-300	ton	—	@16.50
86-90%-300	ton	—	@13.50
Asbestine	ton	16.50	@20.00
Atomite	ton	—	@27.50
Barium carbonate (98-100%)	ton	47.00	@49.00
Barytes	ton	25.35	@36.00
Bentonite	ton	11.00	@16.00
Blanc fixe, dry	ton	60.00	@67.50
Calcene	ton	37.50	@43.00
Catalpo (fact)	lb.	.02 @	—
Chalk, precipitated			
Suprex white	ton	32.50	@45.00
Clay, Aerfloted, Suprex	ton	10.00	@22.50
Aerfloted Paragon	ton	10.00	@22.50
Crown	ton	10.00	@ —
Dixie	ton	—	@10.00
Kaolloid	ton	—	@ 9.00
Langford	ton	—	@ 8.50
McNamee	ton	—	@10.00
Par	ton	—	@10.00
Witco	ton	10.00	@ —
Cotton Flock (Dark)	lb.	.10½ @	.13
Kalite No. 1	ton	—	@26.00
Kalite No. 3	ton	—	@36.00
Kalvan	ton	—	@100.00
Kalvan "S"	lb.	— @	.09½
Keystone white	ton	—	@14.00
Magnesium carbonate	lb.	.06¼ @	—
Mineralite	ton	—	@30.00
Pyrax A	ton	— @	7.50
Rottenstone (powd. Dom.)	ton	25.50	@37.50
Rubberol	lb.	— @	.17½
Silene (calcium silicate)	lb.	.04 @	.045
Snowflake white	ton	—	@16.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00	@25.00
Whiting, commercial	ton	16.00	@26.00
Columbia Filler	ton	9.00	@14.00
Witco	ton	6.00 @	—
Wood Flour (100 mesh)	ton	30.00	@32.00

MINERAL RUBBER

285°-300° Mineral Rubber	ton	25.00 @	—
Black Diamond	ton	25.00 @	—
Hard Hydrocarbon	ton	25.00	@27.00
MilliMar	lb.	— @	.05½

MISCELLANEOUS

Aromatics—Rodo #0	lb.	4.00 @	4.50
Rodo #10	lb.	5.00 @	5.50
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors	lb.	4.50 @	—
Areskleno No. 375	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.30 @	.34
Santomerse S	lb.	.11 @	.25
Sponge Paste	lb.	— @	.18
Sunproof	lb.	.22¼ @	.27¾
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.50 @	.59
Ty-Ply	gal.	6.75 @	8.00
Unicel (blowing agent)	lb.	.50 @	—

SOFTENERS

Acids			
Acetic, 28%, bbls. [a]	100 lb.	3.38 @	3.63
Nitric, 36 degrees	cwt.	5.00 @	—
Acids, Fatty			
Laurex	lb.	.14¾ @	.17¾
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.10 @	.11
Stearite	lb.	.10 @	—
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	5.70
Soda Ash, 58%	cwt.	1.15 @	2.98
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.10 @	.12
Para-Flux	gal.	.17 @	.18
Para-Lube	lb.	.046 @	.048
Petrolatum, amber [b]	lb.	.03¾ @	—
Pigmentaroil, tank cars	gal.	.20½ @	—
in drums	gal.	.26½ @	.27½
Pine, tanks	gal.	.55 @	—
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol	lb.	.13½ @	.14
Rubtack	lb.	.10 @	—
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	— @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.06 @	—
coal tar	ton	19.00	@22.00
hardwood	ton	16.00	@22.50
pine, 200 lb. gr. wt.	bbl.	— @	4.50
Pigmentar, tank cars	gal.	.20½ @	—
in drums	gal.	.26½ @	.27½
Retort Pine Tar, drums	gal.	.26½ @	.27½
Solvents			
Acetone, pure [a]	lb.	.07 @	—
Benzene, 90%, tank car	gal.	.14 @	—
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.05
Carbon, bisulfide	lb.	.05 @	.08½
Carbon tetrachloride	gal.	.83 @	1.27
Dichlorethylene	lb.	— @	—
Dipentene, cml., drums	gal.	.48 @	.50
Ethylene dichloride	lb.	.07½ @	.08½
Plastogen	lb.	.07¾ @	.08
Reogen (drums)	lb.	.11½ @	.12
Rub-Sol	gal.	.09½ @	—
Trichlorethylene	lb.	.08 @	.09½
Turpentine, spirits	lb.	.78½ @	—
dest. dist., drums	gal.	.50 @	.55
Waxes			
Beeswax, white [b]	lb.	.58 @	—
Carnauba, yellow [b]	lb.	.83¼ @	—
Ceresin, white, dom.	lb.	.13½ @	.15
Montan, crude	lb.	— @	—
Paraffin [a]			
Yellow crude scale, 124/126	lb.	.04¼ @	—
Refined, 123/125	lb.	.05¼ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.95 @	2.05
Gel	lb.	.52 @	.54
Hipar	lb.	.61 @	.63
Powder	lb.	.43 @	.45
Resin	lb.	.43 @	.45
Resin D	lb.	.43 @	.45
White	lb.	1.23 @	1.33
Albasan	lb.	.69 @	.74
Antox	lb.	.54 @	.56
B-L-E	lb.	.43 @	.52
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone A, B, C, D, E	lb.	.43 @	.63
Oxynone	lb.	.77 @	.90
Retardex	lb.	.45 @	.48
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.43 @	.52

EXTENDERS

Naftolen	lb.	.15 @	.25
Vanzak	gal.	.05 @	.06

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Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Colite	gal.	.90 @	1.15
Dipex	lb.	.06 @	.08
Glycerized Liquid Lubricant	gal.	— @	1.35
Lubrex	lb.	.25 @	.30
Mineralite	ton	—	@30.00
Mold Paste	lb.	.12 @	.18
Sericite	ton	65.00	@75.00
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.25 @	—
Amberex Type B	lb.	.18¾ @	—
Black	lb.	.08½ @	.13
White	lb.	.09 @	.15
Brown	lb.	.10 @	.14
Neophax A	lb.	.16½ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.08 @	.12
Sulfur Chloride, yellow (drs.)	lb.	.03 @	.08
Sulfur, rubber mal.ers			
Refined (bags)	cwt.	2.55 @	—
Commercial (bags)	cwt.	2.20 @	—
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

[a] Price Ceilings.
[b] Price Suggestions or Agreements.

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Division of United States Rubber Co.
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For Natural & Synthetic Rubber
"PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.

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The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

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COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS

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Soapstone

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Chemicals and Compounding Materials (continued)

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STEAREX BEADS
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AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66
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THE MARKET PLACE
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Rubber [Cont'd]

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For All Purposes
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CHEMICAL ENGINEER—B.S. Draft deferred. Age 23. Five years' experience in control and development work with rubber latex, rubber compounding, synthetic rubber and resins, reclaims, coated fabrics; also production experience. New York Metropolitan area preferred but not essential. Minimum salary $50-$60 per week. Address Box 1364, RUBBER AGE.

HELP WANTED

CHEMIST—Tire, tube or mechanical. Laboratory, control or research. Excellent opportunity with well-established organization in Pennsylvania. Reply all details first letter. Address Box 1339, RUBBER AGE.

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("Help Wanted" Continued Next Column)

HELP WANTED (Continued)

ONE OR TWO MEN WANTED to work for a Rubber and Plastics chemical supply company giving technical service to customers. Furnish full particulars on past experience and personal background. Address Box 1372, RUBBER AGE.

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